1093 Insight talk

Science communication from a dialogue perspective

Noelle Aarts
Institute for Science in Society, Radboud University, Netherlands

"Science is just another opinion", is often argued when scientists present new insights about contested topics such as climate change or vaccination. Arguably, people do not trust science as they used to do. However, we also see that both scientists and non-scientists constantly search for scientific facts on the Internet in order to pursue their cause. Moreover, our intensive use of research-based technologies, as well as the huge amount of scientific evidence that is used to underpin policies, suggests that society is more scientific than ever.

In this insight paper the interaction between scientists and non-scientists in the context of public debates is discussed from a dialogue perspective. We explore the underlying assumptions and implicit norms that scientists often communicate unwittingly when presenting their work in a discussion with citizens. And - based on earlier published work - we demonstrate how this can make non-scientists feel excluded or even insulted. As a result, efforts to have a discussion based on "facts" are likely to lead to further polarization and distrust.

We argue that values, interpretations and facts cannot be separated and that scientific knowledge cannot be translated unambiguously into societal solutions. Moreover, we assert that citizens have relevant insights and data that may contribute to a dialogue as well. Instead of closing the debate by bringing in the "facts" that people have to deal with, scientists should engage in a dialogue in which their values, norms and assumptions become part of the discussion, and where facts are being presented only insofar as participants find these relevant to answer specific questions in a specific context. However, such a practice is hindered by dominant institutions in science. As Bohm and Nichol (2004) already argued: "If scientists could engage in a dialogue, that would be a radical revolution in science 'in the very nature of science'".

Cees Leeuwis
Knowledge, Technology and Innovation group, Wageningen University, Netherlands

868 Individual paper

Artificial Intelligence on YouTube and Vimeo

Joachim Allgaier
RWTH Aachen University, Germany

A diverse set of artificial intelligence applications is already influencing our behavior. When we navigate the internet, some of them are making decisions for us, for instance, when we use "autoplay" on YouTube. In many areas "artificial intelligence" is hailed as the technology of the future that is going to improve our lives in areas as diverse as health, transport, education or the environment. However, it seems that in many of the promissory discourses about this new technology, it is not entirely clear what kind of technology exactly they are referring to. Much of the actual AI applications work inside computers and mostly remains invisible to the human eye (apart from some form of representation on a screen). This is one reason why illustrations of artificial intelligence often refer to images stemming from science fiction and popular culture.

In this contribution we present results of a pilot study on the public representation of artificial intelligence on social media. Social media has an impact on public and political opinion and is often used for the marketing of new technologies and technological products. Online videos are particularly relevant and powerful media for the public communication of science and technology. Therefore, we have compared representations of artificial intelligence on the two most popular publicly accessible online video-sharing websites: YouTube and Vimeo. Both platforms serve slightly different purposes and audiences. In our contribution, we will give an overview on what kinds of formats and styles are used to depict and represent artificial intelligence on both video platforms, who posts the videos and how often they are viewed. We will also discuss how artificial intelligence is portrayed in the sampled videos and how these portrayals of this influential new technology are related to images stemming from popular culture and science fiction.

Haris Arslanovic
Maastricht University, Netherlands

869 Insight talk

YouTube influencers against climate change: How civil society and new forms of science communication are challenging the German government

Joachim Allgaier
RWTH Aachen University, Germany

Just before the European election a YouTube video titled "The destruction of the CDU" caused political outrage in Germany. The video by the popular German YouTuber Rezo attacked the conservative Government party, CDU, mainly for climate inaction but also for other shortcomings. As a reaction to the following heavy attacks on Rezo and his video from the political establishment, an alliance of more than 70 popular German YouTubers got together to release a second video which had only one message: The YouTubers asked their followers not to vote for the Government or far right parties, because they would ignore the expertise of scientists and the scientific consensus on anthropogenic climate change and therefore would be unable to provide sustainable solutions for the future.

The Government parties experienced dramatic losses in the European Elections and the single biggest winner of new voters was the Green Party. It has been argued that the two YouTube videos had a stronger impact on public engagement and opinion than many of the previous debates initiated by scientists and journalists. This debate is still ongoing and further popular German YouTubers jumped on the bandwagon to attack the climate policy of the German government. They form a very unusual and extremely successful alliance of influencers, academics and scientists in order to increase the pressure on the German government on climate protection.

This contribution presents research in progress on the use of scientific expertise by the involved YouTubers and the role of the scientific experts in the debate, for instance, as providers of scientific fact-checks. In addition, it will also be discussed if and what kind of new forms of expertise emerge on YouTube and also what role authenticity, amenability and interactive dialogue plays for the perceived credibility of the involved actors on YouTube.

921 Roundtable discussion

The role of online video-sharing and online video-sharing platforms for science and technology communication

Joachim Allgaier
RWTH Aachen University, Germany

In this roundtable discussion, we are interested in the impact of online video-sharing on the public communication of science and technology. The online video format has great potential for public science and technology communication, but there are also pitfalls and potential problems that need to be thoughtfully reflected upon. One issue we are going to discuss is the role of particular online video-sharing platforms, such as YouTube, Vimeo, and Facebook Watch. YouTube, for instance, now has two billion users worldwide and is the second most popular search engine after Google in many countries. Many citizens around the world use it as a source of information about science and technology issues.

During the discussion, we will explore the production context of online videos about science and technology. Who creates and uploads videos with science and technology content and what are their intentions and purposes for these videos? Another interesting question concerns the differences and similarities between professional, amateur, institutional and other actors who produce online videos about science and technology. We are going to discuss how the different creators of videos about science and technology legitimize themselves and what audiences they want to reach for what reasons. We also would like to know more about the differences in practices and intentions of journalists, YouTubers, scientists, scientific institutions and others when it comes to online video-sharing. Furthermore, we will discuss what kind of video formats, genres, videographic styles etc., are most successful, widespread and adequate for public science communication. Another point that will be discussed with the invited experts is how online videos on science and technology are perceived by various audiences and how these need to be addressed.

Craig Rosa
KQED, United States

Lê Nguyên Hoang
École Polytechnique Fédérale de Lausanne, Switzerland

Andrea Geipel
Technical University of Munich and Deutsches Museum Munich, Germany

Gianna Savoie
University of Otago, New Zealand

855 Individual paper

How to move masses? Engaging 15% of a population in a biobank with limited time and resources

Annely Allik
University of Tartu, Estonian Genome Center, Estonia

INTRODUCTION: In 2018, the Estonian government launched a program to map the genotypes of 150,000 citizens. The goal is to use genetic data as a basis for transforming the Estonian healthcare system to deliver personalized medicine. Estonia's healthcare system has been revolutionized by innovative e-solutions. Patients and doctors benefit from the convenient access and savings that e-services have delivered. Each person in Estonia has an online e-Health record that can be tracked. Through the electronic ID-card-based access, the health information is kept completely secure and at the same time accessible to authorized individuals. These existing e-solutions will be built upon when incorporating genomic information in everyday health-care practice.

METHODS: In order to recruit participants and increase awareness of the potential of population biobanks, case examples showing the benefits of applying genetic information in health care were presented. To increase visibility, YouTubers and social media influencers were involved, having social media challenges to spread the word and get media attention. In order to make enrolment as flexible as possible, the Estonian ID-card systems and digitally signed consents were applied for sample-collection in a wide network of labs and pharmacies. A participant portal with an ID-login was created for participants to fill in their health questionnaire.

RESULTS: By the end of 2019, there were 200,000 participants in the biobank, increasing the previous cohort from 5% to 20% of the adult population of Estonia in less than two years. As part of the used case examples, around 3,000 individuals received personalized genetic risk information. Their impressions of the results received were collected through the participant portal and will be used in future initiatives involving genetic risk communication.

CONCLUSION: A lot can be done if you think out-of-the-box! The methods used throughout the project can be considered and applied by other countries.

Annely Allik
Estonian Genome Center, University of Tartu, Estonia

Lili Milani
Estonian Genome Center, University of Tartu, Estonia

Liis Leitsalu
Estonian Genome Center, University of Tartu, Estonia

Andres Metspalu
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794 Insight talk

Science, theatre and diversity: the performing arts as a strategy for female empowerment

Carla Almeida
Fundação Oswaldo Cruz, Brazil

As the field of science communication matures and undergoes important transformations, practitioners and scholars increasingly recognize the importance of discussing issues related to diversity and power, and understanding how forces such as gender, race, and class affect the area. Aware of this, and in honour of Marielle Franco, a black sociologist, politician, feminist and human rights supporter in Brazil murdered in March 2018, the Museum of Life set up the play "Cidadela", about a fictional city where women literally have no voice; they can only speak when men are away. With four black protagonists, one being trans, the play goes beyond the debate about women in science to stimulate reflections on gender and racial bias.

At the PCST conference, we will share different aspects of the play, showing what it looks like and how the audience engages with it. Based on an audience study conducted with the spectators of the play at the museum, we observed a strong identification in girls and women with some of the characters, especially with those who have a more determined attitude against customs and traditions. For much of the audience, the main message is that women should be free, above all, to think, speak and be whatever they want. In this sense, "Cidadela" works as a reinforcement of female empowerment and as a critique of chauvinistic society. The Museum of Life is a science centre of a major health research institution in Rio de Janeiro, Brazil, which mainly serves elementary and high school students from vulnerable contexts, with low cultural and science capital.

924 Visual presentation

To write or not to write, that is the question: scientists' perspectives on science communication in a regional newspaper

Susana Ambrósio
CIDTFF - University of Aveiro, Portugal

Science communication (SC) has a crucial role in the promotion of the public understanding of science. In fact, SC initiatives contribute greatly to shape the science-society relationship over time, where Universities and their scientists have a main role in the appropriate development of that relationship (Trench, 2017).

Despite the fact that in the social sciences field the SC initiatives are usually limited (Bennet et al., 2007), the Portuguese social science community have been involved in diverse SC initiatives, with the purpose to contribute to the public awareness of science, particularly in the social/educational research field.

In order to foster SC in this field, since mid-2018, our Research Unit (RU) has had a biweekly column called "Ha Educacao" ("There's Education") in the regional newspaper "Diario de Aveiro", and simultaneously, in the University's official online newspaper, as well as on the social media of the RU and University. This column has been the responsibility of our scientists and covers a wide range of social/educational topics.

We intend to present this initiative and the scientists" perspectives regarding it. After a year of publishing scientists" texts, an online survey was applied to collect their perspectives on the potentialities, constraints and suggestions regarding the column. Results shows that after some initial resistance, this column is now seen as value added in the dissemination of scientists' work. Findings also indicate that scientists are starting to be more aware of the importance of SC. We also collect data from on the online readership of the column. The results indicate an increasing number of readers and of column shares, revealing an interest in the topics addressed.

Despite the somewhat hard column launch, we conclude, as with Trench (2014), that "if great difficulty and complexity were reasons for not making the effort, how much science, or science communication, would there be?" (p.3)!

Maria Helena Araújo e Sá
CIDTFF - University of Aveiro, Portugal

Cecília Guerra
CIDTFF - University of Aveiro, Portugal

961 Insight talk

Science news: using an eye-tracker to assess the relevance of information sources

Luís Amorim
Oswaldo Cruz Foundation, Brazil

To advocate that social media today is of utmost importance to society and for the dissemination of information, including science information, is unnecessary. As some authors argue, the development of digital technologies has led to profound transformations in the way that the public learns about science and technology. One example is that there are a large number of adolescents who choose the Internet as a means of seeking scientific and technological information. In Brazil, a national survey involving 2,206 people aged 15-24 years shows that interest in science is high. The study also indicates that Google (79%) is the main platform young people use to access science and technology information, closely followed by YouTube (73%). WhatsApp and Facebook are also cited by more than half of young people as important tools.

Considering this, and the context of post-truth and fake news, our study uses an eye-tracker and a questionnaire to assess the relevance of information sources for the participants. The experiment was carried out at the Laboratoire des Usages en Technologies d'Information Informations, Paris, involving 23 participants with an average age of 20.5 years, who were divided into two groups. They read four different texts, two from reliable sources (Le Monde and Le Figaro) and two from unreliable sources (Alimentation, Santé et Bien Être, and Santé Nutrition). In one of the groups, there was a manipulation: participants read Le Monde and Le Figaro texts with an indication of unreliable sources and vice versa. Our data indicate that in both groups, there are few fixations (an eye movement that suggests the attention of the readers) on the name of the publication and that the source of information does not appear to have much influence on their willingness to share a story.

Luisa Massarani
Oswaldo Cruz Foundation, Brazil

805 Insight talk

Mind the Lab: A Powerful Tool on Bringing Science to the General Public!

Theodoros Anagnostopolos
SciCo, Greece, Greece

Mind the Lab (MTL) is a pioneering STEM awareness initiative designed to engage people with science in metro, bus and train stations. Current research, along with our own data, indicates that informal science activities mainly attract people who are already pro-science. Thus, the question arose: How can we stimulate interest in other publics?

Created by SciCo, MLT brings hands-on science and real scientists into metro, bus and train stations, to engage new publics that may not otherwise experience informal science activities. In interactive drop-in activities and experiments set up in the heart of the stations, scientists engage and enthuse passing visitors with current research through hands-on participation and informal conversation.

A MTL pilot event took place in the Athens Metro in Greece in 2017. Following its success, MTL Athens partnered with the Paul Drude Institute for Solid State Electronics (Germany), the Autonomous University of Madrid (Spain) and the University of Edinburgh (Scotland, United Kingdom). As a result, MTL Athens, Berlin, Madrid and Edinburgh events followed in 2018 with great success, reaching more than 200,000 people. Our goal within the next 36 months is to scale our developing MTL model to create a global network. This includes interest in creating partnerships with countries in Asia, Latin America and Sub-Saharan Africa. We envision that MTL events will take place annually on the same day in a minimum of 20 different cities, motivating scientists, public engagement professionals and science communicators to collaborate and engage the public around the world with science and current research.

The "transformation" theme of PCST 2020 inspired our proposal to share our project and our learning so far in widening participation via new audiences and methods.

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621 Insight talk

Know Your Audience? A Look into What Romanian Researchers Think About the Public with Which They (Don't) Engage

Alexandra Anghelescu Tiganas
University of Bucharest, Romania

We asked a large group of Romanian researchers who have received funding through a state agency within the past five years to answer a questionnaire designed to assess their attitude toward public engagement, as well as their perception of the public in general.

The approach for this research was suggested by Levy-Leblond's statement from his article in the first issue of Public Understanding of Science Journal, in 1992: "(S)hould we not supplement our studies and activities on the understanding of science by the public, with studies and activities on the understanding of the public by scientists?"

The conference will be the first time that the preliminary results of this study are shared with an international audience. I expect to bring results from a country previously absent from this arena, as well as a new direction for research relevant to the wider audience of PCST.

The questionnaire is based on the Theory of Planned Behavior, according to a direction followed by many researchers since 2007, when Poliakoff and Webb's paper, "What Factors Predict Scientists Intention to Participate in Public Engagement of Science Activities", was published in Science Communication, as well as Wrightsman's Philosophies of Human Nature questionnaire, described in 1962 in the "Measurement of Philosophies of Human Nature" paper published in Psychological Reports.

The research is ongoing at the time of this submission. However, the results will be in and processed by the time of the presentation, which will likely propose a new understanding regarding the gap areas for science communication in countries like Romania, with weak public engagement by the scientists.

1080 Insight talk

How does communication drive innovation?

Daniela Antonio
CERN, France

Across different fields of science, there are moments when key decisions are expected to be taken. For particle physics today, these decisions relate to the next big colliders. They involve experts from various fields, all of whom are necessary to the functioning of a particle accelerator. Decisions of this scope often result from a process involving multiple additional stakeholders, both specialised and not: policy makers, media, industry, and even general audiences like the neighbouring community.

To make informed decisions, these key audiences must understand the work done in research institutes and laboratories, so that science continues to find the support and talent it needs to develop. Scientific communication can also inform other scientists of one's activities, overcoming the barriers that separate different disciplinary fields. And communicating outside a technologically rich field allows different experts to understand the complexity of certain developments, which might result in mutually beneficial collaborations with industry and facilitate the societal impact of fundamental research.

In addition, at a time when fundamental research must prove its impact, research institutions and laboratories have finite and limited resources to allocate to communication and outreach. The science communication officers" creativity shines in these circumstances, as they communicate across several channels for a broad field of stakeholders and audiences.

To answer our question, we review the 101 of communication and our strategy to highlight CERN's technology and its applications beyond particle physics. We take a look at our community engagement newsletters", content creation, entrepreneurship events, workshops and networking activities as projects with specific goals, audiences, channels and evaluation methods. We share our learnings in a multi-stakeholder, multi-channel approach, aiming to characterise a generation of communication officers, who have broad expertise and a data-driven approach to the creative process.

561 Visual presentation

Assessment of Management Effectiveness of Hundred Islands National Park in Alaminos City Pangasinan, Philippines

Nicole Maxine Apolinario
University of the Philippines Los BaÃ±os, Philippines

The results of this study can be used to provide a basis to evolve management plans, policies, and strategies that are responsive to the sustainability of the Hundred Islands National Park (HINP). It will help stakeholders such as local and national government agencies, being policy and decision-makers, in addressing the issues and concerns and setting priorities to promote better management policies and practices.

The assessment of HINP is done through on-site evaluation and interviews. The assessment tool that is used is the MPA MEAT (Marine Protected Area Management Effectiveness Assessment Tool) which aims to assess governance or management in terms of enforcement, implementation, and maintenance of the MPAs. The degree to which these management actions are done in achieving the goals and objectives of an MPA would serve as the basis in rating the management effectiveness for the management body of HINP. The ratings for each guide questions provided in the MPA MEAT were based on the observations and interviews conducted. The context of the questions was characterized sequentially from the PA's establishment, strength, sustainability, and institutionalization to generate an overall view of how the management of the PA is working. Each sequence or level in the tool has criteria on which the scoring and the equivalent points were based upon. These points were then summarized and interpreted based on the description provided in the MPA MEAT. Validation of responses from the interviews was done through the collection of supporting documents and secondary data available for the HINP.

Concerning the conference theme, it shows the ability of individuals to participate in science. Public participation as a core to management effectiveness in PAs. How individuals can help in the transformation shows the concept of citizen science. A visual presentation is a good way to present the data analysis.

1097 Insight talk

Engaging deaf and hearing people to design docu-drama on genetics research: preliminary perspectives

Bernard Appiah
Department of Public Health, Falk College, Syracuse University, Ghana

The perspectives of deaf people in the design and implementation of science communication research projects are largely lacking particularly in low- and middle-income countries. According to the World Health Organization, disabling hearing loss affects over 5% of the global population or 466 million people. But how do you explain the genetics of deafness to deaf people and their family members?

A multidisciplinary team involving genetics researchers, deaf actors, actors who can hear, public engagement scholars and drama production experts in Ghana are working together to produce two 25-minute docu-drama science communication toolkits. One docu-drama will use only sign language to help reach deaf students of at least 18 years old in six Ghanaian schools for the deaf while the other docu-drama (with sign language insert) will be used to engage family members of deaf students.

The purpose of the toolkits is to help deaf people and their family members to understand the need for genetics research into hearing impairment or deafness. The lack of such a toolkit is making it challenging for Ghanaian researchers to engage deaf people and their family members for research into genetics of hearing impairment.

In June 2019, the multidisciplinary team of 30 people took part in a two-day, deliberative workshop. The workshop identified the challenges and opportunities of using docu-drama to engage with deaf people and their family members. The workshop also identified storylines for creating docu-drama on the genetics of hearing impairment, and key genetics terms that needed to be explained, among others.

In this Insight Talk (New ideas), we will share preliminary outcomes of the project including the script, and how the perspectives of deaf members on the team are shaping the project. We believe that our project is transformative because it widens the participation in science communication research for deaf people.

Elvis Twumasi Aboagye
West African Centre for Cell Biology and Infectious Pathogens, University of Ghana, Ghana

Paulina Tindana
University of Ghana School of Public Health, Ghana

Kyerewaa Akuamoah Boateng
West African Centre for Cell Biology and Infectious Pathogens, University of Ghana, Ghana

Alfred Tsiboe
KEBA Africa , Ghana

1039 Visual presentation

Practices of Public Science and Technology Communication in Colombia and Spain. Study from the science centers Parque Explora (MedellÃn) and Cosmo Caixa (Barcelona).

Mabel Ayure
Universidad Autónoma de Barcelona, Spain

This paper presents the results of the doctoral research "Public communication practices of science and technology developed in Colombia and Spain in science museums: Parque Explora (MedellÃn) and CosmoCaixa (Barcelona)".

The objective of the research was to analyze the relationship between theory and practice in the PCST practices of these museums. For this, we selected PCST practices of access, interaction and participation developed in these museums during the years 2017 and 2018. The study was developed with a qualitative methodology through documentary review, observation and semi-structured interviews of the actors related to the practices in each museum.

The research questions that were asked were:
- How the practices that communicate science to the public in museums of science of Colombia and Spain are created and developed?
- What is the relationship between the science communication practices of museums and science centers with the traditional models of public communication of science and technology?

To analyze and compare the practices of science centers we define five categories:
- Structure
- Actors involved
- How it develops
- What is the starting point
- Where it is going

The results show two groups of relationships in the development of the practices. In the first group, we identify three relationships between the structure (Contents, Formats, Mediations), the actors (Specialists, Mediators, Public) and the sequence of creation (Scientific selection, Didactic exhibition design, Disclosure) of the practices. In the second group, where major differences can be seen, there is a relationship between the initial engagement modes (Inform / Advertise, Invite / Demonstrate, Consult / Connect) and the final objectives of each practice (Involve, Collaborate, Empower).

Rosa Franquet
Universitat Autónoma de Barcelona, Spain

765 Visual presentation

Taking 'a load off our minds' through 'airing our dirty laundry': an installation for participation and dialogue

Jo Bailey
Wellington School of Design, Massey University / Centre for Science in Society, Victoria University, New Zealand

The 2019 NZ Association of Scientists conference had a theme of "Changing the Culture of Science", with keynotes covering equity, diversity and inclusion. To recognise, counterbalance and give space to discuss the potentially "heavy" content, we developed a playful installation: a low-fi cardboard laundromat called "A load off your mind". The idea was to provide a place to share thoughts about scientific culture: what it is, what it could/should be, and personal experiences that have shaped it. NZAS was our first iteration of this vehicle for collective engagement and reflexivity, which has subsequently been repurposed at the Australasian Association for the History, Philosophy and Social Studies of Science and Science Communication Association NZ conferences.

The catalyst was a comment about "airing dirty laundry", and pertinent puns followed: being "pressed" into action to "iron out" problems; "cleaning up" our acts; getting "all in a lather" over vexing issues; perhaps "agitating""¦ These metaphors" humorous simplicity belie the serious possibility of a laundromat as a transformative "third place" or "third space".

The installation uses projective "probes", fashioned as paper garments containing prompts that feel straightforward, but allow articulation of motivations, attitudes and biases or "thoughts, hopes, and fears" without specifically asking for them. Garments can be placed in a washing machine for cathartic "cleaning", then pegged out on the line to share. This design-led approach seeks informal qualitative responses (drawings, statements, stories). In this context, the laundromat format is exploratory, not confirmatory and is not seeking specific data, rather it allows autonomy for participants to shape their own engagement.

Inspired by Maja Horst's "make an intervention and see what happens" approach, and conducted as an iterative human-centred design practice, we will take you on a spin through "A load off your mind" laundromat, giving a wash-up of what we"ve learnt so far.

Rhian Salmon
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1059 Insight talk

Challenges and practices of technology-light public engagement

Derek Ball
University of Aberdeen, United Kingdom

Academia has recognised the importance of public engagement, in part, because as the finance source for non-private universities, the public are entitled to be presented with and understand the research conducted within those institutions. From the academics perspective, engaging the public in explaining their research provides an opportunity to improve their communication skills and practice through the adoption of alternative methods not normally employed in a standard didactic format. Public engagement is conducted using a wide variety of formats and in many circumstances, within the academic setting, these activities are based around the use of PowerPoint (or similar software) presentations. However, the use of such formats requires the availability of a projector, computer and power source, which may not be available in every circumstance. Consequently, public engagement activities based around technology-light presentations often require a different element of creativity in developing the thread of the engagement activity.

The current presentation will focus on the inclusion of different props employed for a public engagement activity targeted towards a mixed audience (adults and children) with the aim of communicating a range of scientific themes focussed on human physiology. One of the challenges of these activities varies on the size of audience and hence the dimensions of the props so that they are visible across the audience. A further challenge is the complexity of the prop to illustrate the point being made. A variety of props included in public engagement activities will be used in the presentation as working examples that range from the use of educational toys, which tend to be small but attractive to younger audiences, through to media-based game formats (e.g. the wheel of fortune) that are more visible to a larger audience and act as a catalyst for audience discussion.

Derek Ball
University of Aberdeen,

608 Visual presentation

Time for a new audience: Boorna Waanginy, Case Study of an Art/Science/Culture phenomenon

Mandy Bamford
Bamford Consulting Ecologists, Australia

Can art and non-traditional partnerships communicate science to a broad audience? Can they be used to make people care, and take action to protect biodiversity?

Traditionally, biological and geological sciences are communicated to small and dedicated audiences. In contrast, Western Australia's 'Boorna Waanginy: The Trees Speak' used cutting edge technology and a collaborative team of artists, scientists and Indigenous Elders to tell the story of south-western Australia's unique biodiversity through geological time, and explore the parallels between Indigenous knowledge and western science. Boorna Waanginy, the opening event of Perth Festival in 2017 and 2019, was a free, immersive light and sound installation along a one and a half kilometre walk through King's Park in Western Australia. Audiences were exposed to a walk-though experience projected on the trees, where the voices of Indigenous people explained the six Noongar seasons and the species which appear in them. They were then challenged with beautiful, yet chilling visuals depicting threats to biodiversity and were called to act to protect it. In the finale, they were shown stories of people who were already taking action. Following a highly successful season in 2017 which attracted 110,000 people, Boorna Waanginy was updated and remounted in February 2019. In 2019, the show involved thousands of school children and included 'Ground Beneath Our Feet', a practical component to help people take on-ground action to help biodiversity. The show doubled its audience to over 220,000 over four nights and was voted the most popular event at the Festival.

Collaboration with non-traditional partners such as the arts, culture and humanities can engage new audiences and open up powerful opportunities for the communication of science. The presentation will include footage of the event, and the successes, challenges, learnings, and future applications of this approach will be discussed.

Mandy Bamford
Bamford Consulting Ecologists, Australia

1065 Individual paper

Understanding willingness to engage in "democratic outreach" among science faculty at U.S. land-grant universities

Luye Bao
University of Wisconsin-Madison, China

Scientists have long been encouraged to effectively communicate their work with the general public through participation in various science communication activities. However, minimal research has been done to systematically identify the factors that influence scientists" willingness to engage with the public at both individual and institutional levels.

This study constructs an index of "democratic outreach," which includes communication with the public through policymakers and media. Different from previous studies that analyze self-motivation and barriers, we incorporate new variables, such as academic performance and scientists" perceived value of lay public's perspectives on discussions about scientific research. We also extend prior literature by exploring how science faculty's university, college, department, and colleagues influence their engagement in democratic outreach.

To explore what underlying factors determine the likelihood that scientists will participate in democratic outreach with the public, media, and policymakers, we use a 2018 census survey with tenure-track science faculty at 30 land-grant doctoral universities with very high research activities across the United States (n = 5,175, respondent rate = 14.5%).

Preliminary results demonstrate that young scientists are more willing to participate in democratic outreach, suggesting a potential generational difference. Science faculty's relative academic performance is associated with greater willingness to participate in democratic outreach. Connections to public service missions and support from department leaders are positively associated with scientists" future participation in democratic outreach. These findings reveal important factors that encourage the future development of scientists as effective public communicators. This study advances the burgeoning research in public engagement through the analysis of factors rarely previously explored.

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Dominique Brossard
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University of Wisconsin-Madison, United States

1136 Individual paper

Sports fans' science knowledge is relevant to their stance on COVID-19 guidelines, but only if they don't care who wins

Ayelet Baram-Tsabari
Technion Institute of Technology, Israel, Israel

In recent decades, science education has become mandatory in many countries, under the assumption that scientifically literate individuals make better, more logical, informed decisions. However, studies on ideology-related science controversies show that there tend to be larger differences of opinion between individuals with more education and knowledge of science, a phenomenon that is mainly attributed to motivated reasoning. Here we investigated the relationship between background in science, science knowledge, and motivated reasoning in an authentic scenario involving individuals" commitment to their favorite sports team during the COVID-19 outbreak. Sports fans (n = 264) completed an online survey on health guidelines obligating a basketball team to go into self-isolation in the midst of the Euroleague championships.

The findings indicated that being a fan of this particular team was the main predictor of participants' responses: individuals with greater general science knowledge and greater knowledge of the coronavirus were more likely to say that players should stay in isolation, but only if they were not fans of that team. For fans, there was no correlation between general science knowledge or knowledge of the coronavirus and their stance on the need for isolation. This underscores the relevance of science knowledge in taking an informed position on science in everyday life, but also the overwhelming power of motivated reasoning.

Julia Bronshtein
Faculty of Education in Science and Technology, Technion, Israel

Yael Rozenblum
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Yael Barel-Ben David
Faculty of Education in Science and Technology, Technion, Israel

Hani Swirski
Faculty of Education in Science and Technology, Technion, Israel

1139 Individual paper

Public understanding of the mathematical aspects of the COVID-19 pandemic

Ayelet Baram-Tsabari
Technion Institute of Technology, Israel, Israel

As the COVID-19 pandemic became a top concern worldwide, media coverage became full of information that demands mathematical literacy, or numeracy, to interpret. Rarely have graphs, growth factors, or exponential growth indicators been so central in daily mainstream news outlets and over such a long period. In this study we examine the public's understanding of mathematical notions that are basic for understanding the pandemic and predicting its spread. In addition, we wish to examine relations between people's mathematical background, their attitudes towards mathematics and their understanding of the mathematics involved in the COVID-19 pandemic.

We conducted a cross-sectional survey with three components: (1) demographic information, including gender, age, education, occupation and the highest level of mathematics education; (2) attitudes towards mathematics; (3) Mathematics knowledge relevant to the pandemic, including: (3a) de-contextualized mathematics knowledge, such as identifying series of numbers that show linear growth vs. exponential growth, understanding the meanings of exponents etc., and (3b) contextualized mathematical knowledge, including the ability to correctly interpret authentic numbers and graphs of the pandemic used in the mainstream media and social media. The survey was distributed to a representative sample of the Jewish Israeli population (N=439).

Results indicate that the participants' level of highschool mathematics predicted their success in the mathematical tasks. However, even those that had studied at the highest level did not always interpret correctly the mathematical information presented in the media. Moreover, the strongest predictor for understanding the mathematics in the media was found to be participants' attitudes towards mathematics, even more than the mathematical knowledge gained in school. These results show that school mathematics, especially in its high levels, may prepare adults to understand critical information important for their wellbeing, such as at a time of a global pandemic. However, mathematical identity may significantly hinder adults' engagement with such information.

Einat Heyd-Metzuyanim
Faculty of Education in Science and Technology, Technion, Israel

Aviv J. Sharon
Faculty of Education in Science and Technology, Technion, Israel

745 Insight talk

Reflections on 20 years of training in Science Journalism in Brazil

Germana Barata
State University of Campinas, Brazil

Science journalism training at the State University of Campinas (UNICAMP) has turned 20 years old and is the longest-running course in Brazil. The 18-month course is free and has graduated 382 science journalists. Classes are composed of 40 students with backgrounds in science or communication to enrich dialogue and practice in science communication.

UNICAMP has received, since 1999, 69% of the Media-Science Grant Program from the SÃ£o Paulo State Research Foundation (FAPESP). This important support improves students' training and scientists" perception about science communication.

A total of 498 students have enrolled in the course, and women are the majority among journalists and scientists of all fields, including hard sciences (51%). Biomedicine is the main field of scientists (45.9%). There is a higher dropout rate among scientists (19.8%) compared to journalists (9.5%), and men (16.1%) compared to women (10.4%). Thirty-nine students (10.2%) have started a Master's degree and seven a PhD in science communication or in Science & Technology Policy at UNICAMP, showing the courses" relevance in expanding the interest in science communication research.

We surveyed 203 students to know if they currently work in science communication. The majority are women (66%) from SÃ£o Paulo State (79.3%) and 71.4% work in science communication, mainly among journalists. The course may improve employability and be considered more relevant among journalists and women, a hypothesis that will be investigated.

In the last 20 years, students have evaluated the course which contributed to refining the program. Training has strengthened practicals in science communication, multimedia and social media, besides partnership with Unicamp's communication channels and commercial media to boost professional experience. Course completion work is focused on the journalism market, practical communication solutions and will be publicly presented.

Future challenges include decreasing the dropout rate among scientists; investing in startups; strengthening science communication practice among graduated scientists; offering short-courses and establishing international partnerships and improving students" survey.

Simone Pallone
State University of Campinas, Brazil

Alessandra Carnauskas
State University of Campinas, Brazil

932 Insight talk

Citizens on the driving seat of solar energy research

Luisa Fernanda Barbosa Gomez
University Pompeu Fabra - Studies Centre on Science, Communication and Society, Spain

The world is increasingly demanding a shift towards a sustainable energy system that uses renewable sources. Despite the societal relevance of energy research, there is a clear gap of participatory science projects in the field. For instance, when searching for citizen science projects on SciStarter with the keyword "energy", only two relevant results show up. One of them is an Australian app that allows citizens to participate in energy surveys, learn about energy challenges and read about the latest breakthroughs. The other one uses gamification to let young people design renewable energy systems for cities across the U.S. based on real scientific data. However, none of them yet connect to an ongoing research project.

After identifying such a gap, GRECO intends to transform the relationship between citizens and research that tackles the societal challenge of secure, clean and efficient energy. To achieve such a goal, GRECO researchers and science communicators are based on open science, responsible research and citizen science. For instance, GRECO coordinates a participatory and innovative citizen science process that can be described in four steps. First, researchers propose how citizens can actively collaborate in their research. Second, an online hackathon to design a citizen science project is made, with 62 participants from 15 countries around the world. Third, the proposals received are evaluated and one is chosen. Fourth and last, the co-created citizen science initiative is developed and launched to be adopted by the solar energy research community. "Generation Solar" has been fully launched in web and mobile versions since 2020 and there are now more than 130 installations registered.

With this process, GRECO seeks to include society in the decision-making, design and exploitation process of solar energy research and innovation, and put citizens in the driver's seat to recognize the relevance of photovoltaic energy on a more sustainable world.

Gema Revuelta
University Pompeu Fabra - Studies Centre on Science, Communication and Society, Spain

Ana Belén Cristóbal
Universidad Politécnica de Madrid, Spain

Regina Schwald
European Science Communication Institute, Germany

Martin Brocklehurst
KempleyGREEN Consultants - European Citizen Science Association, United Kingdom

993 Insight talk

Fun with Electromagnetism and Art: The role of a museum exhibition in the formation of educators for scientific communication

Matheus Barros
Dica Museum / Federal University of Uberlândia, Brazil

Science museums offer lots of possibilities for science communications as the science contents may be considered the main heritage and the exhibitions represent opportunities to engage public with science. Besides that, the exhibition bears the marks of the team and its creation process. Therefore, we present here three moments that marked the process of elaborating strategies for an exhibition about electromagnetism for a science museum in Brazil linked to a local university. The first moment was marked with a team of museum educators discussing philosophic, historic, and scientific contents to develop a narrative for the exhibition focused on Physics, that was presented to the public in 2015. In addition, with the engagement of physics undergraduate students, the educational team of the museum elaborated some new digital strategies were developed to incorporate to the exhibition in 2016. In a third moment, the purpose of the exhibition was revisited and a new team, involving physics and biology undergraduate students, to purpose a new narrative interweaving concepts of physics and sustainability. In this scenario, we could see that each of these three moments represented a different way for the presentation of scientific concepts, allowing the public to have different views on the science of Eletromagnetism, highlighting the team's marks in the exhibition. In addition, we believe that the process of elaborating the exhibition not only highlighted the views of the team but also left marks on them, provided by the involvement of people from different backgrounds and creating narratives to tell the stories. Thus, we understand that the Dica Museum, being a university museum, fulfills its role of training people, providing undergraduate students of physics and biology the opportunity to develop skills to elaborate narratives for the communication of science.

Silvia Martins
DICA Museum / Federal University of Uberlà¢ndia, Brazil

Natália Nunes
DICA Museum / Federal University of Uberlà¢ndia,

958 Individual paper

Faith or/in Science: the cancer's cure pill controversy

Aline Bastos
Federal University of Minas Gerais, Brazil. , Brazil

A pill that can cure any type of cancer without side effects and at low cost was supposedly developed by Professor Gilberto Chierice at the Institute of Chemistry - University of São Paulo (USP). It was known as the synthetic phosphoethanolamine, the 'phospho' or the 'cancer’s cure pill'. This Brazilian case is extreme and a furious debate set the country's best university against hundreds of cancer patients who want access to what they consider a miracle cure, based on some testimonials and slight scientific studies.

Gilberto Chierice persisted that his findings are indeed scientific truth and that his denial is the product of a conspiracy propagated mainly by pharmaceutical industry. As the British physician Andrew Wakefield (anti-vaccine campaign) and the Spanish biophisic Andreas Kalcker (Miracle Mineral Suplement), the scientist's ability to persuade largely lays on his charismatic qualities, especially on his ability to unify a 'us' clash against 'them' and invent a crisis that requires the guidance of a sacrificing leader. In polarized societies, in which false news and conspiracy theories spread rapidly through social networks, thoughts and beliefs reverberate in groups with contradicted political or economic interests.

By analysing the posts and comments in two Facebook Groups - “Fosfoetanolamina” (32.585 followers) and ”Fosfoetalomina Testimonial” (45.094 followers) -, we intend to construct a panorama about the arguments and discussions brought to life by the users that interact in these groups. With this material, we aim to understand how “science” and “myth” interconnect in discussions about “phospho” and Dr. Cherice, specially in the period of his death on July, 2019.

From the earliest days, medical science has been strongly marked by religious beliefs and magical rituals. More recently, scientific evidence-based medicine has gained preponderance in a strong attempt to separate the past. This case reveals that this past is not far behind.

Amanda Chevtchouk Jurno
Federal University of Minas Gerais, Brazil

601 Individual paper

Beyond Science: the Brazilian "cancer's cure pill" controversy

Aline Bastos
Federal University of Minas Gerais, Brazil. , Brazil

This paper seeks to analyze the controversy of synthetic phosphoethanolamine, popularly known as "cancer’s cure pill" based on thematic analyses. Phosphoethanolamine began to be studied in Brazil by a group of researchers from the Institute of Chemistry - University of São Paulo (USP) in the 1990s, with promising preliminary results for cancer cure and treatment. Capsules with synthetic phosphoethanolamine were distributed freely to cancer patients for almost two decades by Professor Gilberto Chierice until his retirement in 2014.

Giving popular commotion, Brazil’s President sanctioned the Law 13,269, on April 13, 2016, which authorizes synthetic phosphoethanolamine uses by patients with cancer. About a month later, the Brazilian Supreme Court suspended the Law. However, this controversy goes on until now, involving several sectors of Brazilian society, such as National Congress, Justice, Media, Scientific Community, Physicians, Regulatory Agencies and Civil Society.

The inductive qualitative analysis revealed a strong polarization of opinions, beliefs and values "‹"‹that have been established in recent years in Brazilian society, which leads to the following division: 1) the defenders, based on emotional and religious appeals, mainly by an altruistic feeling which wanting to avoid the suffers in others; and 2) the detractors, based on (scientific) reason, by defending institutions, regulations and ethics, in not subjecting sick and fragile persons to harm and greater risk.

These results lead us to see that public involvement in scientific processes has risks and benefits. In this case, it may represent patients' access to "cancer cure" with low cost and without legal barriers. On the other hand, it can represent a "fraud", since its clinical effects could not be proved. In this way, this case is not displaced by a world social phenomenon behind the anti-science and pseudoscience movements.

Attitudes to Science in 144 countries - re-examining the Wellcome Global Monitor of 2018

Martin W Bauer
London School of Economics and Polititical science, United Kingdom

Science is universal, but science culture remains local. The cultural authority of science is globally variable. Within this complex of research, a perennial question concerns the relationship of general attitudes as a horizon for specific issues, often controversial at least in some world regions, such as vaccination. The Wellcome Trust's Global Monitor offers a unique platform to assess this issue on a global scale of 144 countries (n=144,000 interviews, conducted 2018). This symposium will re-examine this data using the PREK model [promise, reserve, engagement and knowledge) of science attitudes with focus on different world regions (Bauer & Suerdem, 2016 and 2019). Knowledge indicators include 'self-confidence' and 'image of science', engagement indicators are 'information seeking' and 'polyphasia science & religion'; promise is assessed by utility assessments of science, and the key reserve index is 'vaccination hesitancy'. The five speakers will each assess the complex of these four indicators in a world region and examine the specifics of the culture of science in that world region. Geography is not destiny, so socio-economic indicators will be coming into the frame of analysis. The symposium will be commented on by Petra Pansegrau (Uni Bielefeld) and Rajesh Shukla (Price, Delhi).

Introduction: Cultures of Science and the Wellcome Global Monitor: a conceptual re-analysis

Martin W Bauer (LSE)

Communicating risk of vaccination in East and Southeast Asia: society, science, and cognitive polyphasia

Luke Yuh-Yuh Li (Taiwan)

Trust in science and religion as indicators of polyphasia across sub Saharan Africa

Bankole Falade (Stellenbosch)

Attitudes to science across South and North America- Alaska to Tierra del Fuego

Carmelo Polino (Oviedo, Spain)

Linking subjective and objective indicators of science culture on the Silk Road: A multilevel analysis

Ahmet Suerdem (Bilgi Istanbul)

Discussants: Petra Pansegrau (Bielefeld, Germany) & Rajesh Shukla (Delhi, India)

Communicating risk of vaccination in East and Southeast Asia: society, science, and cognitive polyphasia

Luke Yuh-Yuh Li
National Sun Yat-sen University, Taiwan

In the section, we mainly examine public resistance to vaccination in three parts: 1)of the social structural differences, 2)of cognitive polyphasia, and 3) of the understanding of science. On social structural differences, we focus on attitude difference of vaccination on gender, age, education, income. On cognitive polyphasia, we would like to see whether cognitive polyphasia mentality have any influence on citizens' attitude of vaccination. On the relationship with the understanding of science, we focus on PUS variables (of trust in science, trust in medical professional, knowledge of science, engagement with science, and utilitarian attitude), and their relationship with attitude of vaccination. We assume that the meaning of risk is culturally defined. People all take or not take action to reduce risk. The data includes 13 countries in East Asia and Southeast Asia, which includes the sample population of Indonesia, Singapore, Japan, China, Philippines, Vietnam, Thailand, Cambodia, Laos, Myanmar, South Korea, Taiwan, Malaysia, and Mongolia with a size of 13,477. Regression analysis is employed for the statistical analysis. We first create a general model with country fixed-effect for pooled data. Then, we also examine our model in individual country data, respectively. We have found

more complicated findings from the country level data. In the end of the presentation, we are going to discuss our findings of their special local context meanings.

Trust in science and religion as indicators of polyphasia across sub Saharan Africa

Bankole Falade
Stellenbosch, South Africa

Religion is an important variable in science and society studies in sub Saharan Africa and a Nigerian study has shown the public have same levels of trust in scientists and religious leaders but scientific knowledge and religiosity have a direct effect on expectations of progress and feelings of fear about and worry about science (Falade and Bauer, 2018). Studies have also shown that religious leaders have in the past intervened in vaccination programmes leading to revolts in Nigeria, Cameroon, Tanzania, Uganda and Kenya (Feldman-Savelsberg, et al., 2000; Milstien, et al., 1995; UNICEF ESARO, 2003; Falade, 2015). Nigeria is yet to be declared polio free due to a mix of vaccination hesitancy, religious beliefs and logistical challenges. The recently released Wellcome Trust's Global Monitor provides a unique opportunity to compare indicators of trust, knowledge, information seeking and promise as indicated by vaccination hesitancy across African regions: East, West, Southern and Central Africa with a view to mapping cultural differences. Affiliation: Dr Bankole Falade is with the South African Research Chair in Science Communication, Centre for Research on Evaluation, Science and Technology, Stellenbosch University. The South African Research Chair is the Initiative of the Department of Science and Technology and National Research Foundation of South Africa (Grant No 93097) ORCID ID https://orcid.org/0000-0003-1985-2273

Attitudes to science across South and North America- Alaska to Tierra del Fuego

Carmelo Polino
Centro Redes (Argentina) and University of Oviedo (Spain), Argentina

In this communication we will apply the PREK model (promise, reserve, engagement and knowledge) over the Wellcome Trust's Global Monitor data to study the feelings of people living in Latin America, the United States and Canada in what respect to science and health. Science culture indicators reveal high social and cultural authority of science. Particularly in Latin America, a region weighed down by inequality and structural poverty, society perceives democracy, the political system and institutions critically (Latinobarómetro, 2017; Pew Research Center, 2019). Science builds trust and emerges as a prestigious social institution, and this perception remains constant over time (Castelfranchi, 2019; Polino & Muñoz van den Eynde, 2019). In the United States, confidence in science and scientists has remained high for forty years (relative to other social institutions), although depending on geographical, religiosity or political segmentations (Krause et al, 2019). In the US, partisan divide is strong on climate change, education and risk perception are more relevant in Latin America (Evans and Zechmeister, 2018). The idea of the social responsibility of scientists, the need to regulate research and evaluate technologies socially, is also present. Thus, as in other social areas, cognitive resources tend towards a more critical examination of knowledge and to the de-sacralization of institutions. Criticism can be greater in the most disadvantaged social groups since they are the ones that benefit the least from the results of knowledge and technology. Consequently, the map of perceptions is complex: a "distant public" does not show interest, and manifests reservations to science - and a fraction of "trusted public", that without information or participation activities, has positive views (Polino & Castelfranchi, 2019). Positive attitudes coexist with criticism, and both aspects are necessary for and adequate management of public affairs when misinformation, fake news and sensationalism threats global democracy.

Linking subjective and objective indicators of science culture on the Silk Road: A multilevel analysis

Ahmet Suerdem
Istanbul Bilgi University, Turkey

Research activities of any society depend on the level in which its members interact with science and cannot be separate from that of a society's cultural activities'. Science translates itself to innovations through consumption, production and policy decisions. Problem-solving manners and capacity of the individuals in a society are embedded in the "cultural repertoire" encompassing the symbols, artefacts and everyday practices. This repertoire is used by the group members to construct "strategies of action" for solving the everyday problems (Swidler, 2001). Hence, scientific activities find their way into everyday life through science culture. The aim of this study is to explore the complex relation between the subjective mentality factors such as attitudes, knowledge, interest and political involvement to science and institutional and economic environmental variables surrounding these factors. Building upon the PREK model [promise, reserve, engagement and knowledge) of science attitudes this study will present how these intrinsic

variables are related to science environment factors such as R&D expenditures, number of patent applications, and human development index. Besides these factors, social values reflecting the general cultural environment of the society will also be considered. The Welcome Trust's Global Monitor data will be used for deriving the intrinsic-subjective elements of science culture. The environmental data will be collected from secondary sources such as UNESCO. World Value Surveys and Hofstede culture surveys. Statistical analysis of these data involves multilevel analysis which considers the social contexts as well as the individual respondents or subjects. Multilevel data is analyzed through the hierarchical linear regression model which is a type of regression analysis for where the dependent variable is at the lowest level. Finally, the study will compare how subjective mentality factors are related to external environmental factors with a special emphasis on Silk Road countries.

Commentary

Petra Pansegrau
Bielefeld University, Germany

Live commentary will be offered on the papers above together with Dr Rajesh Shukla (Price, New Delhi; rajesh.shukla@ice360.in)

778 Insight talk

A Question of the Future

Anita Beck
Questacon - National Science and Technology Centre, Australia, Australia

Questacon has 30 years of experience in communicating science through shows, workshops and exhibitions, so delivering another exhibition isn't new, however Questacon's current exhibition Born or Built?: Our Robotic Future (BOB) showcases a new approach to science communication via exhibitions. Open to the public in April 2019, BoB explores our relationship with technology, now and into the future, using questions as a basis to promote dialog and discussion.

Exhibitions on contemporary evolving technology can be challenging with content becoming out dated before the exhibition is opened. To mitigate this issue, Questacon took a calculated risk to develop a contemporary science exhibition which contained almost no informational content and focused on societies changing relationship with technology through provocations.

15 interactive exhibits ask visitors questions while 6 interactive kiosks provide hundreds of ethical and philosophical questions for visitors to explore. Answers are compiled and displayed on a digital wall. Another exhibit provides visitors with an opportunity to ask questions which are then answered by subsequent visitors.

The approach has proven successful with visitors contributing nearly 500,000 answers to questions as well as posing over 6000 of their own. The data collected from the 500,000 answers are available to Universities, Industry and Government and is proving an invaluable insight into public opinion on technology in our lives, even being considered in policy development. Undergraduate and masters classes have visited the exhibition to discuss public opinions and concerns around A.I. and the ethics of technology. Initial evaluation indicates success with visitors dwelling in the exhibition 40% longer than in equivalent sized exhibitions. Observational data suggests this is due to prolonged conversations and debate.

This exhibition could prove a useful model for contemporary science exhibitions in the future. Not only solving information overload, but acting as a useful source of information for the wider community.

1020 Individual paper

Landscaping Overview of North American Science Communication Fellowship Programs

Nichole Bennett
The University of Texas at Austin, United States

As science communication training programs grow in number and reach, fellowship programs provide arguably some of the most intensive and impactful science communication training experiences available. These programs grant scientists from across multiple disciplines access to authentic science communication experiences in particular contexts (e.g. policy, media, festivals, museums), with the goals of introducing scientists to the career and of improving their science communication self-efficacy. However, little research has focused on understanding the landscape of science communication fellowship programs. We conducted semi-structured interviews of science communication fellowship directors in North America to understand the infrastructure of these programs as well as their impact on their trainees and the communities they reach. This is especially timely as, to date, fellowship programs appear to operate largely in isolation from each other and without clear understandings of what makes them similar and different from other fellowship programs. This lack of self-awareness and interaction among fellowship programs hamstrings the community's ability to build scale, diversify reach, and identify agreed-upon best practices. Our research aims to provide an exploratory foundation that enables the science communication fellowships community begin understanding itself so it can achieve its full potential.

Anthony Dudo
The University of Texas at Austin, United States

John Besley
Michigan State University, United States

1147 Individual paper

Health authorities' health risk communication with the public during pandemics: a rapid scoping review

Siv Hilde Berg
Centre for Resilience in Healthcare, Faculty of Health Sciences, University of Stavanger, Norway

Background: Scientific insights from the H1N1 Swine flu pandemic and the recent coronavirus pandemic COVID-19 provide an opportunity to get insight into the role of health authorities" various ways of communicating health risk information to the public. Hence, we aimed to synthesise the existing evidence regarding different modes of communication used by health authorities in health risk communication with the public during a pandemic.

Methods: We conducted a rapid scoping review. MEDLINE and EMBASE were searched for publications in English from January 2009- through October 2020, covering both the H1N1 pandemic as well as the response phase during the COVID-19 pandemic.

Results:The search resulted in 1440 records, of which 48 studies met our eligibility criteria. The included studies were analysed in a content analysis.

Conclusion: The identified studies on social media focused mainly on engagement. There is a lack of studies investigating the effect of health authorities" videos and messages on social media platforms and self-protective behaviour. More studies with RCT design are needed across the fields of health risk communication and media studies (including visual communication, creative communication, video, digital marketing) at a time when online digital communication is central in reaching the public.

Jane O'Hara
School of Healthcare, Faculty of Medicine & Health, University of Leeds, UK., United Kingdom

Henriette Thune
Faculty of Health Sciences, University of Stavanger, Norway, Norway

Siri Wiig
Centre for Resilience in Healthcare, Faculty of Health Sciences, University of Stavanger, Norway

Marie Therese Shorrt
Centre for Resilience in Healthcare, Faculty of Health Sciences, University of Stavanger, Norway

Kolbjørn K. Brønnick
Centre for Resilience in Healthcare, Faculty of Health Sciences, University of Stavanger, Norway

581 Visual presentation

Research, #Huh? - Improving Clinical Research Awareness

Emma Berry
NHS Grampian, United Kingdom

Background:

Clinical research is behind most of the advances in healthcare, but its public perception can be quite negative. Previous work has been carried out to improve research understanding, but many people still do not know what clinical research is and its importance. We believe that improving the understanding of research will lead to more clinical research studies, as well as higher recruitment and involvement.

Aim:

To plan an engaging way to communicate with the public about clinical research, to improve awareness and understanding.

Methodology:

We have developed a website to improve clinical research awareness. The website contains customised resources to encourage understanding of clinical research - including an animation and videos of studies' participants and research staff. We have also developed a clinical research interactive game and a database with information on studies open for recruitment in NHS Grampian. The website and customised tools have been guided by public and staff involvement.

Results and Conclusions:

The website was launched in March 2018 and it is the first stage to improving awareness and involvement within NHS Grampian. We are now using this website as a platform to promote research engagement. We are evaluating this project, to establish its impact on public engagement in clinical research.

Mariella D'Alessandro
NHS Grampian, United Kingdom

722 Roundtable discussion

What can science communicators learn from national public opinion surveys

John Besley
Michigan State University, United States

What can science communicators learn from national public opinion surveys?

Public attitudes and perceptions towards science and technology (S&T) are important for a wide range of actors – science communicators, policy makers, scientists and many others. A number of countries therefore have regular S&T public opinion surveys. The proposed panel will bring together researchers involved in four such projects from different parts of the world – Switzerland, Brazil, the United Kingdom, and the United States — to discuss what role their national survey plays in thinking about science communication in their countries.

The four countries were chosen because they represent different contexts and models and, thus, contrasting cases from which to learn. The Swiss project is a foundation funded, multi-year project based at a university and designed to address practical and theoretical questions. The Brazilian surveys are conducted by public sector organizations with a large role played by communication researchers. In contrast, the American survey is conducted on behalf of a federal advisory group with raw data that is immediately made public as part of a long-running national social science data source (the General Social Survey).

Panel participants will briefly share the rationale behind their survey programs, as well as their perceptions of strengths and limitations. Afterwards, the discussion will be opened to other meeting participants who are invited to share their experiences, perceptions, and hopes for national-level survey projects. The goal for the panel is to enable researchers interested in these types of projects to better design and use the data collected. Some key questions that we will pose to stimulate the discussion include: What are the current benefits and challenges? Are these surveys worth the resources? Who should conduct these surveys (e.g., academics, government, etc.)? What should be the focus? What are the advantages of coordination versus independence?

Julia Metag
University of Münster, Germany

Martin Bauer
London School of Economics, United Kingdom

Luisa Massarani
Fundação Oswaldo Cruz, Brazil

1082 Individual paper

Quantitative approaches to complement understanding in science communication activities

Rodolfo Bezzon
University of Sao Paulo, Brazil

Most works using Cultural Historical Activity Theory (CHAT) tend to fall on the qualitative side of the research approach continuum, because this theoretical framework emphasizes a deep analysis of the cultural-historical context in which the individual is immersed and also an analysis of her/his activity in this context and, considering the methodological characteristics of the qualitative methods, they do fulfill these requirements more easily. Nonetheless, quantitative research is also necessary to better understand the problem being investigated, because quantitative methods shed light in ways that qualitative cannot. Although we agree that a precise distinction between both methods is unnecessary, we do believe that there are characteristics in their strategies that are worth to keep in mind and that some researches and papers abstain themselves of the bigger debate: the theoretical lens they are using. The theoretical framework is the one that will guide the researchers throughout the process and signify their results, support their analyses and, in some cases, even determine which questions can be asked. Despite all that, some researchers do not make it clear which theoretical lens they are using, they simply jump straight forward to the methodology and, thus, undermine the consistency of their own work. In this sense, our research group is trying to develop new ways to work with CHAT in science communication activities, especially in quantitative approaches, for two main reasons: 1) make our analysis more robust, by adding different research approaches we can analyze the problem through different angles; 2) develop CHAT and test the theory’s limits and possibilities in science communication comprehension. So right now, we are trying to find ways to make our questionnaire dialogue with CHAT and thus build up a more coherent analysis of science communication perceptions and practices in different cultural-historical contexts.

Alessandra Bizerra
University of Sao Paulo, Brazil

1087 Insight talk

Science institutions' distribution and their role in science communication access

Rodolfo Bezzon
University of Sao Paulo, Brazil

Brazil is a continent-size country, with a diverse culture and even more diverse people. Despite all this richness, we have come to find our country has about 0.1 science center/museum per 100 thousand citizens, and some states do not have a single science institution while others have less than 5, meaning that these science institutions do not ensure science communication access. Other researches show that poor and working-class people, no matter what age and educational background, are the ones that hardly ever visit these places and also are the least interested in science and technology issues, but this also affects all social classes, because even the upper classes do not visit science center and museums frequently, which probably have to do with the low number of institutions per citizens cited previously. Building up the problem, Brazilians see religious leaders more reliable than scientists, contributing to an unsatisfying science communication (and also signaling we must do something about it). With all that said and using Cultural Historical Activity Theory framework to interpret this data, we have a lack of science-related out-of-school structures (science-culture ‘goods’) to communicate and keep our people interested in science and technology. Aiming to tackle this problem, we are conducting a research with two goals: first one, to map São Paulo state’s science and technology institutions and also their visitors, in an attempt to better understand and scale one of Brazil’s most populated state scientific ‘goods’ (in this case materialized as science centers and museums) and with that and our analysis, the second goal is to better inform politicians and stakeholders into actions and policies to improve our science communication.

Alessandra Bizerra
University of Sao Paulo, Brazil

1108 Demonstration

From the Magic of Science to the Science of Magic. Past, present and (blended) future.

Fernando Blasco
Universidad Politécnica de Madrid, Spain

Since the Middle Ages, Magic has used mathematical and scientific (yet uncommon) experiments to entertain, surprise and create awe in people. This demonstration will address the history of such magic and science relationship, while providing current ideas and looking into the future. Because it seems that the mid-21st century will consist of practical interconnection between brains and machines, and also practical usefulness of artificial intelligence.
Our group has been working in a Magic & Science project for several years, especially in the fields of Mathematics and Chemistry. We are active in searching and adapting existing games and experiments (even classical ones), while creating others towards Science Fairs, Workshops, demonstrations and special events.

This communication thus will focus on the use of Magic and Science as a tool to address the changing relationship over time between science and the arts and humanities. Because use of Magic to communicate Science concepts allows for ample connection to Arts and Humanities. Two particular cases, among others, will be stressed: one of us (FB) is currently using Mathematical Magic in innovative projects in Architecture Undergraduate Projects. Moreover, we are also involved in creating online games on the Periodic Table of the Elements. The session will be organised with physical demostrations and hands-on activities. They will be focused at matter related with time, such as calendar tricks and time dependent chemical reactions.

All in all, we think that this innovative way to communicate science may be quite useful in different places and environments, while not requiring especially high budgets nor a lot of time and effort, while allowing for strong attention from the Public so they may receive messages effectively.

Sílvia Simon will deliver her experience on Low-Cost Communication of Science, Miquel Duran on Physics and Chemistry aspects, and Fernando Blasco will lead this activity and focus on mathematics.

Miquel Duran
Universitat de Girona, Spain

Silvia Simon
Universitat de Girona, Spain

551 Insight talk

Gene drive, public engagement and communication : Hype and lobbying

Christophe Boete
Université de Montpellier, France

The discovery of CRISPR has led to the development of gene drive systems that could be used to spread desired traits in a target species or to exterminate a population within a few generations. This controversial and disruptive technology has raised hopes and fears regarding its application for public health (malaria control), conservation (protection of endangered species, elimination of invasive ones), or agriculture (pest control).

By reviewing and analysing the communication around the so-called promises of this technology in relation with its numerous limitations, my aim is to address the question of hype in which gene drive approaches are embedded and to present the similarities with a situation that occurred years ago with the Human Genome Project and the associated ‘genohype’ coined by Neil Holtzman.

Regarding the diffusion of the information about gene drive, its developers themselves are often highly involved in communicating about it in order to obtain acceptance. This leads to a communication that tends to be much closer to propaganda than to a two-way dialogue and the deficit model is usually not far. More worryingly this strategy also involves tight links with lobby firms such as the International Life Sciences Institute, an organisation that was banned by the WHO from direct involvement in its activities.

Given the different positions on the applications of the gene drive technology between environmentalists, biotechnology companies, and lobby groups, it is essential that academics need to know who speaks for whom in this debate and with whom they are getting involved. Apart from showing the major role of non-state actors on an innovation with potential global consequences, this presentation should permit to highlight the need to reinforce the role of democratic institutions (UN Bodies) and to rethink the expertise in order to build trust between stakeholders while avoiding a manufacture of consent.

Christophe BOETE
ISEM, Univ Montpellier, CNRS, EPHE,IRD, Montpellier, France,

800 Individual paper

"I want to, but there is no time!" - a Swedish survey on researchers' views on communication

Gustav Bohlin
Public & Science (VA), Sweden

Communication between researchers and society is vital for research to have a societal impact. Nowadays, researchers are increasingly expected to engage in communication activities involving non-scientist audiences. Although there have been a large quantity of studies on knowledge, interest and confidence in research among the general public, less is known about the researchers' own views on communicating their work with the outside world. This paper will present findings from a large-scale survey conducted among 3,699 researchers in Sweden during 2019. The large sample allows comparisons to be made among subgroups based on gender, area of research, age or career stage. The study was a joint venture between the non-profit organisation Public & Science (VA) and five Swedish research funding organisations. Questions in the survey include, for example, perceived barriers and type of support needed to engage in communication activities. Another topic in the survey is the researchers' awareness of the nature of support they can receive from communication professionals in their organisation. For further insights on this topic, a separate survey with communication officers (n=169) in Sweden was also conducted. Together, the results provide a base for an informed discussion on how to stimulate communication between researchers and society in general.

Martin Bergman
Public & Science (VA), Sweden

801 Insight talk

Open Sesame! What do researchers think of Open Science?

Gustav Bohlin
Public & Science (VA), Sweden

Open science is about making research more accessible and transparent to both researchers and society in general. It encompasses several potentially transforming aspects such as open access to research publications, open data, open peer review and open source. Other often associated practices seek to involve societal stakeholders through science communication, public engagement or citizen science. For the researcher, involving citizens and other actors at various stages of the research process makes communication more important and complex than before. So far, the transition towards open science has largely been driven from a policy-maker perspective, most notably by the European Commission. However, less is known about the researchers' own perspective on a transformation that will bring several practical changes to their daily work.

This paper will present results from interviews (n=10) and a survey (n=3,699) conducted in 2019 with researchers at Swedish universities about their understanding/awareness of open science as well as their concerns and hopes. The results show that nearly two-thirds of the researchers have heard of the term. The majority believes that the benefits of open science outweigh the disadvantages, but there is disagreement as to whether the system will make their work easier or more difficult. Several differences in attitudes are found across scientific disciplines and career stage of the researcher. Other topics to be presented include researchers' awareness of and attitudes toward alternative methods of measuring research impact (altmetrics) and citizen science.

Martin Bergman
Public & Science (VA), Sweden

1109 Demonstration

Breaking the rules / transforming the future

Tilly Boleyn
Science Gallery Melbourne, as part of the University of Melbourne, Australia

Scientific and cultural institutions worldwide have traditionally focused on knowledge creation and production. But what then? How do you communicate all your excellent knowledge to the 'general public'? How do connect individuals to that knowledge to create a scientifically literate society ready to create solutions to the world's biggest challenges?

This session explores the evolution of approaches to engaging people with science and the arts and humanities at three different Science Galleries across the globe. Science Gallery blurs the boundaries between science, art, design, technology, maths and engineering. We've broken all the rules and instead embed our target audience, young people aged 15-25, into every aspect of our approach: idea generation, exhibition planning, work selection, promotion and in-gallery engagement. What happens when you connect and involve young people in the creation of a gallery?

This participatory workshop will take you behind the curtain into our process. Each Science Gallery engages young people, experts, and communities to develop its exhibition themes, artworks, and public program in a different way. Come and experience what it's like to be involved in the process and explore the ecosystem of the Science Gallery network.

This session illustrates the transformations that take place when you share power with young people. Spoiler alert: it transforms visitors, the young people involved, the process and the olde-timey-staff (anyone aged 25+). This session will challenge the traditional narrative about who's opinion matters, explain how to engage young people in important issues and illuminate what makes a transformational experience.

Jen Wong
Head of Programming at Science Gallery London, King's College London, United Kingdom

Aisling Murray
Exhibition Manager, Science Gallery Dublin, Ireland

1164 Visual presentation

Untangling the Truth: COVID-19 crisis

Nabanita Borah
Science Communicator and Researcher (Independent), India

Disseminating scientific knowledge to non-experts is always crucial. Information to non-experts, especially without scientific background, gets lost in the process of simplification. Complex and ever-evolving subjects, e.g. the medical sciences, confuse people. In developing countries like India, reasons like over-dependency on traditional beliefs and alternative medicines, existence of harmful myths and practices in the community, lack of a universal health-care system, lack of scientific mindset and also the complex socio-economic strata make the dissemination of knowledge even tougher. Social-media-misinformation adds another level of complexity to the problem.

The issue gets worsened in situations like COVID-19 that demands collective, fast and wise response from the society. Thus, one major challenge in India has been communicating with the public effectively about the disease, related healthcare risks and creating awareness about following protocols in a unanimous way. The knowledge-gap and sometimes the uncertain stance of healthcare agencies has led to groups such as “no mask”, “invincible due to Indian immunity”, etc. Act of labelling COVID-19 as political propaganda has led to more confusion.

The objective of this study is to communicate all necessary information regarding COVID-19 and the pathogen in a simplified language with an aim to educate the audience about how to stay immune to misinformation during this emergency. The Assamese community of India is selected for our study. We are initially using Facebook (both in Assamese and English) as a medium of communication for a faster dissemination of knowledge to a heterogeneous group of people. Efforts are made to accommodate audiences’ both cognitive and emotional engagement in the posts and also not to confuse the audience, while updating the posts to include the latest discoveries.

We have analysed the posts’ performance, readers’ expressions and views. We also present the pros/cons of the method and problems faced during the dissemination process.

Gitartha Bordoloi
Faculty, Fakruddin Ali Ahmed Medical College and Hospital, Assam, India

Olag Pratim Bordoloi
Doctoral Researcher, Tezpur University, Assam, India

1121 Visual presentation

Science communication in an interdisciplinary research project: the interplay between scientists, art historians, conservators and the general public

Francien Bossema
Centrum Wiskunde and Informatica, Netherlands

The Impact4art project develops CT scanning as a tool for art historical and conservation research. We visualise the structure and inside of art objects, which is of importance for research into the manufacturing process and for conservation purposes. The project is a collaboration between the Center for Mathematics and Computer Science (CWI) and the Rijksmuseum, both in Amsterdam, The Netherlands. We aim to build bridges between science, art history and conservation. There are two main communication aspects: interdisciplinary communication and communication to a wider public. The present increase in academic interdisciplinary research projects requires researchers from different fields to find a common language. We would like to share our experiences with this in IMPACT4Art and discuss with the audience the challenges and best practises concerning interdisciplinary research communication.

Next to that, the communication of the results of this project to a broad audience features other interesting challenges. Art objects are often beautiful and intriguing to all audiences: researchers and laymen alike. The audiences attention is captured by the many secrets hidden within the object which can be investigated using CT technology. We would like to invite participants to engage in a discussion, led by the following questions. How can we use this natural fascination for arts and crafts to effectively communicate both the results and the underlying technology? How important is it that the public understands and engages with the technology, or is it enough to be thrilled by the object and just experience the research results? In other words: what is the goal of the outreach to the general public and how can we investigate the effect of these outreach activities?

Erma Hermens
Rijksmuseum, Netherlands

Joost Batenburg
Centrum Wiskunde and Informatica, Netherlands

1150 Individual paper

Rapid reaction: Science Media Center Germany and its response to the COVID-19 outbreak

Irene Broer
Leibniz Institute for Media Research | Hans Bredow Institute, Germany

This contribution offers an ethnographic account of the editorial response to the COVID-19 outbreak by the Science Media Center (SMC) in Germany. SMCs are intermediary organizations that operate between science and journalism by providing summaries and expert statements on scientific publications and controversial science topics. SMCs have been established in the UK, Australia, New Zealand, Canada, Japan, Germany and Taiwan. Despite their potential impact on the journalistic portrayal of science, however, they have so far received little empirical investigation. Given that public crises may transform the communicative relationships between actors in science communication, intermediary organizations like the SMC provide important perspectives on COVID-19 communication.

Ethnographic data was gathered during a 4-week fieldstay in January 2020 which coincided with the outbreak of COVID-19 in Germany. It includes interviews, field notes of editorial meetings and chat logs, as well as SMC publications. The analysis shows how the newsroom staff grappled with the scientific uncertainties surrounding COVID-19 while simultaneously dealing with acute journalistic demands for conclusive expertise. This process was marked by the gradual recognition of the outbreak as a public crisis, an adaptation of editorial routines, practices and formats and a consolidation of the organization's self-perceived mission.

Five core findings will be presented: 1) How anticipatory routines including gatewatching and expertise-gathering helped SMC Germany prepare for a swift response; 2) How the right moment for coverage was decided through a continuous process of relevance assessment by weighing the lack of available scientific knowledge against rising media attention; (3) How new communication strategies helped SMC Germany respond to the rapidly changing insights about the virus; (4) How SMC Germany adapted its publication formats in order to keep up with journalistic demand; and (5) How the COVID-19 outbreak worked to highlight SMC Germany's role as a knowledge broker in the science communication landscape.

876 Visual presentation

Climate change risk perception in mining companies: a look from sustainable development

Claudio Broitman
Universidad de Santiago , Chile

The Atacama region in Chile is an area with intensive Medium and Small scale mining activities. The waste generated by this mining activity coexists with local communities, remaining invisible to most of the Chilean population. The risks associated have been exposed by high altitude rains occurring in the region with a frequency that has been associated with climate change, but those rains are not conceived as a mining activity risk by mining companies. How do mining corporations construct risk through sustainable development? How is that risk related with climate change?

This work explores the interactions between mining industry, climate change and risk representations through the analysis of mining companies sustainability reports. For questioning the way mining corporations understand risks as environmental impacts, we search the way those corporations communicate sustainable development. To reach those companies, we download the data containing all the Atacama Region Mining Facilities (743). As our interest was related to communication, we filtered the information, excluding all the inactive or abandoned Tailing Storage Facilities. The result was 30 active Mining Tailing.

We implemented then a microscopic examination of data (Strauss & Corbin, 2002), reaching only four companies that communicate their sustainable development strategy. Our corpus is then constituted by twelve sustainable development reports (four companies for three years each). Based on the grounded theory (Strauss & Corbin, 1998; Glasser & Strauss, 1999), we codified our corpus, estabilishing comparisons in order to build an open codification across the analysed documents. We selected three main keywords/phrases (strategy, risk and sustainability) from three different perspectives: environmental, social and R+D. We compare across our corpus how those keywords were published and the way they were associated with different perspectives. We stablished then an axial coding, (Strauss and Corbin, 2002), relating the categories that emerged from the open coding to their subcategories.

Ortiz Claudia
Universidad de Santiago, Chile

Juan Carlos Rodriguez
Universidad de Valparaiso, Chile

877 Visual presentation

A Social Science Innovation Laboratory

Claudio Broitman
Universidad de Santiago , Chile

Demand for Science Communication is growing everywhere. Not only science journalists, but also Journalism schools are heavily required by discontent scientists that want -or are forced to- to voice their own researches, confirming the well-known diagnose about the persistency of a deficit model (Trench, 2008). But science communication is not only a tool. Communication tools don't provide a better communication (Jamieson, Kahan & Scheufele, 2017), and the relationship between science, communication tools and communication is non-linear. Science Communication is also an epistemic frame that allows us to think about this problem from two perspectives: inside and outside the university. How can we produce knowledge from this two perspectives?

Simultaneously, the science communication problem is not exclusive from a field of knowledge, like basic sciences. Social sciences, humanities, arts and applied sciences have also the same issues. The Social Science Innovation Laboratory genesis came from the need of the Department oh History students and professors to communicate Cultural and Political History research. Usually, students don't have enough skills for producing journal articles about their thesis or academic works. And frequently professors only know to produce papers. In an partnership with the Journalism School, we implemented an scholarship program to fund our students to produce a product starting from professor's research. We invite them to think Science Communication, putting together teachers from academia and professional world: design thinking methodology, storytelling, brain and feelings methodology, monumental projections and 3D mapping, social media content. The results were presented on a public manifestation where we invite local community and external stakeholders.

This proposal seeks to show those experiences and discuss about the possibilities to enlarge our laboratory experience to other sciences and new formats. Can those formats participate in a Science Communication debate? Could be an alternative from the traditional ways?

Carla Rivera
Universidad de Santiago, Chile

777 Individual paper

Terra incognita - shedding light on the public's views of humanities research

Fredrik Brouneus
VA (Public & Science), Sweden, Sweden

Since 2002 the non-profit organisation VA (Public & Science) has been following confidence in research among the Swedish public. The results reveal a consistent pattern of confidence levels for different research areas: medicine comes out on top, followed by technology, natural sciences, social sciences, educational sciences and, lastly, humanities. Interestingly, the decisive difference between medicine and humanities is not found in the proportion claiming to have low confidence in the respective research areas; rather, it’s in the percentage of people that have “no opinion” that the areas differ. A significantly larger proportion of Swedes lack an opinion about their confidence in research within the humanities compared to that for medicine, natural sciences or technology. In recent years, our follow-up studies (e.g. public focus groups, analyses of media coverage and interviews with journalists and researchers) have provided clues to possible explanations for this pattern. Currently we are combining a quantitative survey with in-depth interviews, to focus specifically on the “no opinion” group. The purpose is to learn why it is that different groups in the population lack an opinion about their confidence in humanities research, whether they perceive this to be a problem or not, and what they need in order to form an opinion. In this paper we will present preliminary results, linking them to findings from our previous studies. We will also discuss how results may be used to develop public communication of humanities research. The project is funded by the Swedish Foundation for Social Sciences and Humanities.

Martin Bergman
VA (Public & Science), Sweden

Fredrik Brouneus
VA (Public & Science), Sweden

Gustav Bohlin
VA (Public & Science), Sweden

776 Visual presentation

Stuck without the middle - how facilitators can help researchers do better citizen science

Fredrik Brouneus
VA (Public & Science), Sweden, Sweden

Engaging volunteers in research through citizen science can pose unfamiliar challenges to even the most experienced researcher. As new stakeholders are invited into the research process, demands arise for expertise and resources not normally required in traditional research projects. Since 2009 the Swedish non-profit organisation Public & Science has been coordinating an annual citizen science project for schools as part of Swedish European Researchers' Night events (ForskarFredag). In these "mass experiments", we have helped researchers collaborate with tens of thousands of Swedish pupils on a wide variety of research questions. Through this collaboration, researchers get access to data that would have been impossible to collect through traditional research, the pupils get a hands-on experience of doing real research, while teachers have the opportunity to include research-based material in the curriculum. To date, the mass experiments have explored topics such as light pollution, digital source criticism, climate change and biodiversity. As coordinators, our tasks include helping researchers structure and adjust their communication on aims, methods and research tasks, and in providing participants with timely and targeted feedback – tasks that are not part of the regular toolbox of a researcher, but which are key to a successful citizen science project. We further assist researchers in adapting research protocols to the needs and preferences of the intended target group(s) while ensuring good data quality, recruiting and organising teachers and students, and doing media work for wide dissemination. In this visual presentation we will describe our model for facilitating citizen science, based on 11 years of experience as an intermediary between science and society. Here, we will discuss opportunities and challenges related to all steps of the process, from selecting the research topic and stimulating researcher–participant dialogue, to disseminating results and conducting post-project evaluations.

Martin Bergman
VA (Public & Science), Sweden

Lotta Tomasson
VA (Public & Science), Sweden

1005 Insight talk

The Pleasure of Pursuit

Autumn Brown
Trinity College, Dublin, Ireland

Reshaping the global culture of science through a pleasure-based pursuit of knowledge.

Science is often contrasted with arts and humanities as an endeavour of utility. We study and we memorise scientific methods and phenomena because we have to, or because these concepts are useful. But how might the way we communicate science be changed if we re-conceptualise the pursuit of scientific understanding as pleasurable. The intensity of illumination, or revelation will never be replaced by a facile delivery of impersonal scientific concepts. If we as science communicators are to be effective, it is imperative that our practice be not only elucidating but include an element of enchantment.

Informed in part by the works of Maria Popova, and the theoretical perspectives of Bentham and Mill, this talk explores new methods for reshaping our understanding of science as a pursuit often impacted and guided by desire and aesthetic longing. With examples from the history of science and technology it will invite attendees to consider this approach as a philosophically and empirically supported method for effectively communicating science. We will also go into new comprehensive approaches to measuring psychological pleasure both quantitatively and qualitatively for impact reporting.

1063 Individual paper

Assessing the landscape for Public Communication of Science curriculum among Canadian undergraduate programs in the natural sciences.

Adam Oliver Brown
Dept. of Biology (Faculty of Science) and Faculty of Education, University of Ottawa, Canada

The landscape for the Public Communication of Science (PCS) is rapidly developing in Canada, wherein it is seen as becoming increasingly important for scientists to communicate directly to the general public and to attempt to make their scientific knowledge accessible for informed decision-making by non-scientific citizens in society. Scholars of science communication note, however, that there are numerous, marked differences in the approaches and skills required for the effective communication of science between scientific and non-scientific audiences, as well as the unique challenges associated with communicating science across a number of media platforms. Furthermore, it is commonly recognized that undergraduate students of science do not receive much (if any) training for PCS skill development from traditional university programs in the natural sciences, despite the importance placed on science outreach from science professors, departments and universities. In order to assess the nature of the PCS skill-development offered to undergraduate students of science in Canada, we performed a nation-wide study to determine where and how these skills were being taught. We compared the reported learning outcomes offered on the websites of programs in natural science departments from all universities across Canada, as well as an analysis of directed surveys to all Faculties and Departments offering undergraduate programs inquiring about the nature and extent of PCS content in their programs. Using follow-up surveys, we directly polled professors involved in PCS curriculum offerings to give us more information about the nature and content of these activities. From these results it has been shown that professional attitudes towards PCS in Canadian academia are favourable and encouraging but that there is often a gap in the availability of curriculum that actively addresses learning of PCS skills among their programs. This study highlights the importance of curriculum development for PCS pedagogy in undergraduate science programs across Canada.

Chantal Barriault
Science Communication Graduate Program, Laurentian University, Canada

Sydney Smith
Dept. of Biology, University of Ottawa, Canada

Erin MacIsaac
Science Communication Graduate Program, Laurentian University,

987 Visual presentation

Guides at the Horizon: Art+Science Learning Spaces

Autumn Brown
Trinity College, Dublin, Ireland

What role should science communicators play in the movement towards knowledge and innovation based societies? Is it to summon up space where we might host and facilitate complex scientific, ethical, technological and philosophical discussions across communities and disciplines? Opportunities to engage with science in accessible and informal settings have become vital opportunities for those seeking to contribute to, and actively participate in the culture of science outside of school. How can we create environments which unsettle traditional power structures and encourage open discussion?

This presentation will explore real world examples in creating culturally relevant and engaging science learning opportunities through the use of art and purposeful dialogue. We will examine the function of visual art in shaping conversations at the local and national level when mediated by professional science communicators. The presentation will take a critical look at the role of the science communicator as guide, provocateur and fellow learner when exploring new and complex ideas in a non-formal learning environment.

Art has the potential to empower individuals and communities, and act as a powerful catalyst for change. Coupled with the praxis of learner/artefact mediation, it is a valuable instrument in the exploration of self, the affirming of identity, but also the expression and critique of complex ideas. Exploring the utility of this approach will give us as practitioners, and researchers fresh insights into the future of collaborative science and innovation.

628 Insight talk

Cardinal virtues and capital vices in science communication

Massimiano Bucchi
Università di Trento, Italy

How do we recognise “good” and “bad” science communication?

The theme of quality has long been neglected in our field, as it has been the theme of values of science communication.

During the last decade, however, in the literature as well as at PCST conferences, a new and promising discussion of these themes has begun, highlighting (among other things) that quality in science communication cannot be neither assessed nor addressed without reference to the broader social, political and cultural context, including values, aims, expectations towards science communication.

In this insight talk, I propose explore the potential of traditional cardinal virtues and capital vices to provide a source of intellectual inspiration for dealing with the challenges of quality and values in science communication.

For example, do vices like wrath or pride belong in (bad) science communication? And can we regard prudence and temperance as virtues of good science communication?

This insight talk is based on theoretical studies and reflection (from Aristoteles to contemporary science communication studies), drawing upon examples and results from science communication research (e.g. studies of aims of science communication, impact evaluation studies).

618 Roundtable discussion

Science communication studies: where are we now?

Massimiano Bucchi
Università di Trento, Italy

The panel will examine key ideas and trends in science communication studies as the field has developed during the last decade.

What is the common lexicon, what are the core ideas, theoretical and empirical backgrounds that a student of science communication is supposed to be familiar with today?

The panel is organised in connection with the publication in 2020 of the 3rd edition of the Handbook of Public Communication of Science and Technology (Routledge).

How has the field changed during the decade since the first edition of the Handbook appeared (2008) and what are the current trends and challenges?

The panel will feature the two editors and two contributors of the Handbook, plus a discussant.

Maja Horst will offer insights from the cultural-sociological study of science communication. In particular, she will discuss issues of identity and sense-making. Science communication is not just about making complicated things simple, so that lay-people can understand them. It is also about who we are as citizens, scientists and scientific organisations in a modern knowledge society.

Julia Metag will address issues in the analysis of science publics, such as the relationship between information behaviour and attitudes towards science, the formation of different segments in the public as well as methodological questions of researching science publics.

Massimiano Bucchi and Brian Trench will propose an expanded definition of science communication that embraces informal, non-purposive communication as well as that which is targeted and strategic, and that goes beyond the deficit versus dialogue dispute that remains an undercurrent of current discussions.

Germana Barata will add further insights and elements for discussion.

Brian Trench
DCU, Ireland

Maja Horst
DTU, Denmark

Julia Metag
University of Muenster, Germany

Germana Barata
State University of Campinas-Unicamp, Brazil

994 Visual presentation

Virtual Reality system in nuclear physics: a new strategy for science communication

Antonio Budano
INFN Sezione di Roma Tre, Italy

In this work we present an original and new example of science communication and teaching of nuclear physics based on Virtual Reality (VR) system technology. VR systems are currently one of best architecture used for interactive experiences, since it guarantees a complete immersion of the user into a simulated but realistic environment. In recent years it is mostly used in the video games field, grabbing the attention of a young audience. On the other hand, nuclear physics is typically one of the most tough science to be communicated or taught.

Our aim is to show how we can improve our communication skills by mixing the VR system with nuclear physics and how this idea encourages people to approach to this field. In particular, we will bring our VR equipment to show the Belle II experiment with the help of its corresponding VR application which can be used as a didactic tool in physics at all levels: from high schools to university professors. This application makes it clear to the audience how particle interaction occurs in a detector. In fact it is possible to explain various physics concepts by exploiting the best visual representation of the experiment and the elementary particles moving inside it. This VR application represents one of the only powerful tool for "observation" in the science of the infinitely small. Moreover, the degree of detail obtained thanks to our application allows to understand the operation of the particle detector and the behaviour of the particles that pass through it in a simple and cool way.

Alberto Martini
Università Roma Tre - INFN Sezione di Roma Tre, Italy

Giacomo De Pietro
Università Roma Tre - INFN Sezione di Roma Tre, Italy

Federico Budano
INFN Sezione di Roma Tre, Italy

Martina Laurenza
Università Roma Tre - INFN Sezione di Roma Tre, Italy

1029 Individual paper

Actions and associations: understanding scientists' perceptions of public engagement through analyses of open-ended survey responses

Mikhaila Calice
University of Wisconsin-Madison, United States

Science communication research increasingly explores public engagement activities among scientists, but research on how scientists understand public engagement is underdeveloped. Conceptualizations of public engagement rarely include perspectives of scientists, especially in their own words. In this study, we use an inductive approach to explore how scientists perceive public engagement.

Using data from a summer 2019 survey of scientists from 46 land grant universities throughout the United States (N=8235, response rate = 14.1%), we examine scientist perceptions of public engagement. We specifically analyze responses to an open-ended question that asks scientists to list the first three words that come to mind when they think of “public engagement.” Of the scientists surveyed, 94 percent provided at least one word, resulting in a total of 21,491 responses. When accounting for duplicates, the final sample includes 7,925 unique word associations with the term public engagement. A factor analysis of word frequencies identified the dimensionality of these answers to expose definitional themes of public engagement. We used these extracted thematic categories as a baseline definition of public engagement. We then analyzed how this definition aligns with scientists’ views about the intended outcomes of public engagement and which engagement activities they participate in.

Preliminary findings show that “outreach” and “education” are core components of scientists’ perceptions of public engagement, suggesting many scientists surveyed have a traditional view of engagement. In addition, these analyses demonstrate how scientists’ perceptions of public engagement relate to their reported engagement activities. The analysis of these open-ended responses clarifies understandings of public engagement in science communication efforts. With such clarification, this paper will provide insight into ways to encourage the transformation of engagement opportunities for scientists. Our approach further illustrates the value of inductive methods in research of complex concepts such as public engagement and aims to encourage replication in geographies around the world.

Luye Bao
University of Wisconsin-Madison, United States

Dominique Brossard
University of Wisconsin-Madison, United States

Kate Rose
Dartmouth College, United States

Ezra Markowitz
University of Massachusetts , United States

Michael Xenos
University of Wisconsin-Madison,

657 Insight talk

Communicating (African) biodiversity through capulanas

Rita Campos
CES-UC - Centre for Social Studies, University of Coimbra, Portugal

Capulanas are traditional fabrics found in many African countries, usually display a rich diversity of colourful patterns and several patterns have shapes allusive to natural elements. Being also easy to manipulate, capulanas offer a unique opportunity to initiate a conversation about African biodiversity. This was tested in a series of sessions with pre-schoolers (3 to 6 years old) held in the scope of an exhibition about the biodiversity of Mozambique. The sessions started with an exploration of a terrestrial globe, where the children were able to identify their current country, Portugal, and continent, Europe, and relate it to Africa and Mozambique. Then, the children were invited to choose their favourite capulana from a pile and find the biodiversity “hidden” in the pattern. This led to a discussion about the species represented, where they live, why some species can only be found in a given part of the world or if a given species is more or less known, abundant or likable. In other words, the capulanas allowed to talk about biodiversity, evolution, adaptation, geography, environmental characteristics, human induce changes, ... Finally, the children engaged in a “paint your own capulana” activity, which allows to understand how biodiversity is perceived by young children and how science communication can target the “invisible species”. These sessions have a high potential to engage the audience, promoting co-construction of knowledge from shared stories and perceptions, and are easily done with other traditional and non-traditional fabrics, widening the geographic area and the discussion about different species or other topics related to biodiversity or environmental sustainability. Furthermore, since traditional fabrics are connected to social and cultural aspects of human societies, it can be used as communication vehicles for delivering a diversified range of messages or reaching different groups, including publics traditionally less interested or engaged with science.

571 Visual presentation

(Re)Thinking cities through the eyes of young children

Rita Campos
CES-UC - Centre for Social Studies, University of Coimbra, Portugal

As more and more humans move from rural to urban settings, there's a growing scientific interest related to the impacts and benefits of urban green spaces on humans. Evidence shows a positive relation between urban biodiversity and health, well-being, quality of life and social interactions. Urban green spaces are important parts of the urban ecosystem. In times of rapid climate change, larger green spaces, in particular, offer solutions for dealing with extreme heat waves, debacles or floods. Additionally, these "urban forests" are also spaces that promote a first contact with the natural environment, and the local biodiversity, and consequently motivate informal environmental learning. Many of these spaces also have a high historical and cultural value, helping to build the identity of the city and their inhabitants. Thus, research results highlighting the positive impacts of urban green spaces should be used to inform decisions in city planning. But what really matters to preschool children when planning urban settings? Young children are actors usually excluded from political decisions and also from many science communication projects. However, participatory science communication models can help to connect their everyday life with both local policies and science-related content, empowering them in agenda-setting. Using a participatory approach for engagement, combining visual methods and storytelling, we aimed at understanding what preschool children prefer in the city landscape so that their interests can be included in urban development and foster the inclusion of children in the designing and planning of their environment. Results show how young children envision a "better city" and how that construction sometimes defies current scientific data. It further illustrates how science communication can be used to produce new knowledge on issues that usually exclude the targeted public - preschool children - and that contributes to the debate about people' needs and perceptions and science-based options.

585 Visual presentation

Let's talk about climate change... but when do we start?

Rita Campos
CES-UC - Centre for Social Studies, University of Coimbra, Portugal

Climate change poses numerous challenges to the environment and the survival of species, humans included. But in spite of the scientific consensus related to the influence of human activities on environmental imbalance, and the recent civic mobilization demanding political action to address climate change, there is still some resistance on the public opinion about the real impacts of the current climate crisis. Science communication can be a powerful ally to raise awareness on these issues.

“Coats for snow” is an activity to help communicating the impacts of climate change and foster new dialogues on the topic. It was designed as a “consultative science communication” activity, inspired by the “AEIOU vowel analogy” of science communication. As such, to facilitate Interest and Understanding, we tell a story inspired on ongoing research, studying how species adapted to cold environments with winter snow can be affected by increasing global temperature and consequent decrease of snow cover. To promote engagement and Enjoyment, we use a game that allows the active participation of the public. To contribute to informed Opinions and behavioural changes, we include a before-and-after debate, where different aspects of climate change can be addressed.

The activity was tested with children aged 9-10 years old after a guided visit to a Natural History Museum Gallery. It proved to be an attractive strategy, encouraging highly interactive discussions around climate change and its impact on biodiversity. However, even though climate change is widely mentioned in the media and many school students are adhering to climate strikes worldwide, almost all children that participated in the activity declared that they have never heard of it. This led us to conclude that efforts to communicate and engage the public with climate change issues should include younger children. Results from the “coats for snow” activity show that it is possible.

José Melo-Ferreira
CIBIO-InBIO - Research Centre in Biodiversity and Genetic Resources, InBIO Associated Laboratory, Un, Portugal

1114 Visual presentation

Tilling an artistic way to undertands the hyperbolic honeycombs

Ricardo Candás Vega
Centro de Investigación en Matemáticas, Mexico

The presentation aims to interact with representations and graphic demonstrations of some complex mathematical concepts such as space, infinity, symmetry, Euclidean and non-Euclidean geometries, tessellations, etcetera using some drawings and constructions of 3-dimensional Hyperbolic Honeycombs as an artistic and interactive model to appropriate these concepts always through simple and basic concepts, such as: point, line, polygon, polyhedra and reflections, and take advantage of the dynamic nature and beauty of the drawings, which were created in Mathematica, to show an artistic and visually attractive side of mathematics.

Following some of these ideas, we are presenting a game of labyrinths on tessellations in the Euclidean plane where the moves are constrained to rotation and axial symmetries in the tesselations. These can help the comprehension of some mathematical concepts and show another artistic and attractive representation of mathematical concepts. We have used these labyrinths in mathematical rallies with college students and math olympiad participants. The participants got engaged and were able to understand how to play.

Valentina Múños Porras
CIMAT, Mexico

Marco Antonio Figueroa
CIMAT, Mexico

Berta Gamboa de Buen
CIMAT, Mexico

895 Visual presentation

Connecting science to people: the role of National Research and Education Networks (NREN) in science communication

Oscar G. Cardenas Hernandez
Universidad de Guadalajara, Mexico

National Research and Education Networks (NREN) are essential components to meet the national and international connectivity needs of research and education, and for strategic collaboration in e-Learning, e-Science, and e-Research. NREN are vital for modern universities, as they increasingly depend on services based on internet protocols to operate mail, learning management systems, cloud computing, storage in independent data centers, videoconferences, distance education, information repositories and digital libraries. They are also key elements for science popularization and social construction of knowledge. RedCLARA, a Latin American Cooperation of Advanced Networks made up of thirteen NREN, represents the only Advanced Internet network in Latin America, providing regional interconnection and connection to the world through its international links like GÉANT (Pan-European Advanced Network) and Internet2 (US) and, through them, to advanced networks in Africa, Asia, and Oceania. In 2019 the NREN Summit of the Americas agreed on a common agenda to address and join energies to respond to global urgent issues, and thus increase cooperation and create opportunities to disseminate scientific data and information. Global climate change was identified as one of the most important environmental problems and a group of specialists from different countries started to disseminate data and information of this issue through webinars and virtual meetings directed to both academic and common audiences in several countries in Latin America. The long-term goal of the group is to build a visualization tool that integrates available scientific knowledge on variables and indicators that describe the changes in climate in terms of temperature, atmospheric composition, cryosphere, ocean, and water, as well as the risks and threats associated with hydrometeorological and climate phenomena in various regions of the continent.

Eduardo Santamaría-Del-Angel
Universidad Autónoma de Baja California, Mexico

Sania Ortega
Universidad Técnica del Norte, Ecuador

689 Insight talk

Science Engagement Through Videos

João Cardoso
CNC - Center for Neuroscience and Cell Biology, University of Coimbra; PhD program in History of Sciences and Science Education, Institute for Interdisciplinary Research of the University of Coimbra (III-UC), Portugal

It is undeniable that science communication plays a crucial role in the establishment of relationships between science and society. Nonetheless, the rapid evolution of scientific knowledge and popular cultures, with high digital engagement, demands the development of more and better digital strategies to engage society in scientific topics.

In order to address this challenge, we at CNC have been developing science communication videos focusing on different research topics: the video lines Selfie Science and ASK (Always Seeking Knowledge) Researchers. Selfie Science episodes aim to schematically explain scientific research projects to a non-academic public. ASK Researchers series promotes the online interaction with society - everyone can submit their questions to the featured researcher to be answered in an interview format. We launched the projects in March of 2019 and since then we explored several scientific topics, by releasing an episode of each video line on a monthly basis. We already produced 9 Selfie Science episodes and 6 ASK Researchers episodes, that focused several topics in biomedicine and biotechnology as neuroscience, metabolism, microbiology, aging, cell reprogramming and pathophysiology of different diseases (Alzheimer's, Parkinson's, Amyotrophic Lateral Sclerosis, Depression, Gut Dysbiosis, Machado-Joseph's Disease, Progeria, Autism, Male Infertility and Tuberculosis). In each video, we also demonstrated laboratory techniques associated with each type of scientific research.

We believe that this strategy promoted better dissemination of these various research fields and raised awareness for these diseases in online platforms, as we observed high viewing rates and the topics. We conducted a pilot evaluation study in order to understand the potential of the videos to promote knowledge acquisition and to foster engagement of public towards scientific topics and research.

Ana Teresa Viegas
CNC - Center for Neuroscience and Cell Biology, University of Coimbra, Portugal

Sara Amaral
CNC - Center for Neuroscience and Cell Biology, University of Coimbra, Portugal

580 Insight talk

Belonging within the 'elite': Transforming from being the excluded to citizen scientist

Jessica Carr
The Open University, United Kingdom

One of the oft-cited aims of citizen science is to involve non-scientists in scientific inquiry drawing on their collective community knowledge to inform scientific practices. The relative value of citizen science is still debated by some in the scientific community, however, who believe ‘science is an unashamedly elitist activity’ (Durodie, 2003). These contradictory ideas can create confusion around the values and motivations associated with a citizen scientist with significant implications for identity. At what point can a citizen claim to have transformed into a scientist, and is this a unique category that sits between what it means to be a professional or an amateur?

Citizen science has the power to transform our understanding of the world, but also to create new communities. It is important, therefore, to acknowledge that certain communities aren’t actively engaged. One of these is the learning disabled community, removing their voices from this decision influencing practice. A large part of identity is the feeling of belonging within a community (Strnadova, 2018). Have those initiating citizen science initiatives ignored people with learning disability and therefore denied their membership of a specific community in the past?

My PhD research explores the extent to which people with learning disabilities themselves identify as citizen scientists and have opportunities to meaningfully engage.

In this talk I will present the inclusive and creative methods I am using in my study with a local self-advocacy group to build capacity in conducting citizen science. I will present key aspects of the data I have collected so far, looking at how the participants have approached the task of becoming citizen scientists and researchers. I will discuss what research means to our group, how they identify as citizens/researchers, and introduce some of the lessons for future citizen science initiatives.

1172 Insight talk

Communicating Science in the Making: Science and Society in the Time of Pandemics

César Carrillo Trueba
Revista Ciencias, Facultad de Ciencias, UNAM,, Mexico

Much has been said about the problem in science communication caused by the habit of publicizing results the way they are presented by investigators – “translated,” as it were – abstracting the process through which they were determined (what Bruno Latour calls “black boxes”). Processes for producing knowledge tend to be complex, sometimes intricate, as we have seen in recent months since COVID-19 pandemic started. The competition between research laboratories, pharmaceutical companies and the politicians and governments of each country, the will to demonstrate the truth when everything is uncertain, have led us into a swamp of information, one in which we’ve almost drowned.

One very concrete case was when some laboratories announced the virus’s expected lifespan on different surfaces – from three hours to several days – without verifying if it was still capable of infecting someone, a simple, but variable factor. It provoked great alarm. These were articles published in scientific journals, and were therefore hard to characterize as fake news, but there was a lack of context and insensitivity as to how this news would be taken. How should we then handle situations in which science generates information that is confusing or that could be disproven within weeks?

For years, I have been arguing for the role of the science critic – similar to the art critic – who contextualizes scientific results, makes research processes clear and explains the stakes and the political, economic, ideological, etc. interests at play, even serving as a stepping-stone between research on science communication and its communicators. The COVID-19 pandemic has clearly shown that, without this level of analysis, our role as communicators is weak, null or even negative. We need to contextualize and integrate, an urgent task in these times. This paper is about it.

1071 Individual paper

Thinking Long-Term About Public Controversies

Angela Cassidy
University of Exeter, United Kingdom

This paper will consider long-running public scientific controversies – those in which scientific, social and policy uncertainties have been contested in the wider public sphere over several decades or longer. We draw on case studies of long running public controversies, including international debates over the siting and storage of nuclear waste; air quality; animal feeding; and bovine tuberculosis. By comparing across these cases, some common features become clear, including repeating cycles of built and broken expectations; the persistence - and elision of – memory; and the significance of place. We also observe such features in other long running science-policy-public controversies, including debates over fisheries management; flooding; pesticides; and climate change. They lead us to ask whether these commonalities are the simple consequence of a debate continuing for so long; or if we can identify factors driving the long term continuation of controversies. What roles are played by the public sphere, mass media, campaigners and publics? What are the consequences for research, policy and communication of the sciences involved? Is the prolonged nature of such debates linked to their environmental nature?

Drawing upon the literature on knowledge controversies, media and governance, we have developed a preliminary typology, drawing distinctions between controversies tapping into wider societal concerns; those about the implications of new scientific findings and/or technologies; and those in which scientific knowledge is itself 'in the making'. Such an analysis contributes to longstanding questions about how public scientific controversies are created, intensifed, calmed and resolved; and how policymakers acti in the face of scientific uncertainty. We argue that looking back at the histories of such chronic, longterm controversies creates critical insights not only into how such controversies might be resolved in future, but also into broader problems in the interactions of 'experts', policy and society.

Karen Bickerstaff
University of Exeter, United Kingdom

861 Individual paper

Changing perceptions on S&T in times of "post-truth"

Yurij Castelfranchi
Director of SciComm - Federal University of Minas Gerais - UFMG, Brazil

Disinformation, rumors, hype, are not new phenomena in public sphere: they and cronical problems both for science communication and democracies,. However, growing international evidence shows that contemporary social and technological reconfigurations, and the interaction between desinformation, political populisms, and the markets, generated novel aspects of the problem, that some scholar study in term of a "regime of post-truth".

Using quali-quantitative approaches and methodological triangulation (social network analysis, computer assisted analysis in big data, focus groups, national surveys on public perception of S&T), I studied repcetions and perceptions of S&T in Brazil. Integrating national data with international databases (such as World Values Survey, General Social Survey, etc), I discovered interesting factors affecting how public opinions, and the processes by which people appropriate knowledge, are being transformed. Novel processes. technologies, platforms emerged, affecting the ways in which people access and share information and opinion, and decide when to trust institutions, scientists, and the media. Our analyses show that fake news and fake issues, in a "regime of post-truth", operate in an complex, way. Ignorance and lack of acess are often not the main cause of the problem, but a major effect. Different variables and factors influence the belief in different types of disinformation. Scientific and technological literacy, as well as cultural capital and acess to quality information are important, but not sufficient: moral values, social capital and social interactions, political positions and civic engagement are very strong factors affecting but the cultural authority of science and the reception and acess o publics to science communication. For example, variable associated to perceptions of gender parity, or to political engagement, affect perceptions on climate change, vaccines, pseudo-sciences. Our results point to challenges both for public policies and the PCST: a less neutral, less institutional, more contextual, politicized, and socially engaged science communication is needed.

948 Roundtable discussion

Technoscientific narratives of optimism in newly decolonized states post 1945: interrogating policies and practices

Anwesha Chakraborty
University of Bologna, Italy

The focus on improving scientific and technological infrastructures marked the early years of the vision of an independent, self-reliant India (Abraham, 2006; Roy, 2007). Nationalist leaders emphasized the respect for science and the need to cultivate a scientific outlook as a road to progress. This idea found a robust articulation in Jawaharlal Nehru's The Discovery of India (1946) where he wrote about developing a 'critical temper of science' or a scientific approach to problem-solving, rejecting irrational and extra-scientific beliefs. STS researcher T. Jayaraman wrote that Nehru's 'scientific temper' encapsulates the imagined ethos of a new nation, where critical attitude and rational thinking would take precedence over everything else (Jayaraman, 2009). In fact, the phrase 'scientific temper' was included in Article 51 (A) (H) of the Constitution of India in 1976 as one of the ten fundamental duties of every Indian citizen. This inclusion had significant impact on scientific and educational institutions promoting and communicating science to the public. Talking to the people, persuading them to abandon some of the old ways and adopt a scientific approach were key elements to improving agriculture, health and employment.

Using the Indian instance as a starting point, this roundtable intends to focus on stories of technological optimism that accompanied the nation-building narratives of newly decolonized states in the mid-twentieth century. How much of this narrative managed to find its way into robust policy-making and action? Did nations across continents have similar and/or diverse narratives that defined the emergence of their modern states? What role did science communication play in their creation? The roundtable intends to follow up such discussions which started in the individual chapters of The Emergence of Modern Science Communication (to be launched at the conference) and to prepare a special issue focusing on comparative histories.

Mahaletchumy Arujanan
Malaysian Biotechnology Information Centre, Malaysia

Khalil Raza
Economic Cooperation Organisation Science Foundation (ECOSF), Pakistan

Zahra Oliphant
Ministry of Science, Energy and Technology, Jamaica, Jamaica

1102 Visual presentation

Science communication and science communication research: a dialog in process

Nemesio Chávez-Arrendondo
Universidad Autónoma Metropolitana , Mexico

This presentation analyzes the distance between research and practice.

In 2008 Steve Miller asserts that research examining the nexus between science communicators and science communication research is very scant indeed, suggesting there is very likely mutual misunderstanding between practitioners and researchers. Why science communicators do not read science communication research?

What science communicators need to hear from research? A fair, fully-dressed answer would look something like this: In full cognizance of the diversity and complexity of the science communication field, science communicators need to hear analyses of real practice informed not so much by opposing visions, but rather of such visions existing on a continuum.

This query in conjunction with the practitioner’s vision of science communication as a complex aesthetic endeavor may well be a signpost to guide new lines of science communication research grounded in authentic practice that is at once rich, challenging and aware of its broad freedom of action. The practice of science communication should be treated as an independent academic subject, with its own investigation program, different from the traditional topics and disciplinary perspectives of research.

We agree change the format from paper to a visual presentation following the comments from reviewers about making solid recommendations based on our practice and theoretical perspective. We expect the specific guidelines for visual presentations.

Ana María Sánchez Mora
UNAM, Mexico

Martha Tappan
Universidad Anà¡huac del Sur, Mexico

Sergio de Régules
UNAM, Mexico

1142 Individual paper

COVID-19 making idols: the birth of medical celebrity scientists in China

Siyi Chen
Tsinghua University, China

In the backdrop of the over-politicization of science and science popularization in China, scientists usually are unwilling to engage with the public (Zhang, 2015; Jia&Liu, 2014; Chen et al.,2009). In contrast, some Chinese medical scientists appeared in the public domain since the COVID-19 outbreak in China. They took the initiative to spread scientific knowledge via media and urge the ordinary people to take defensive action against viruses, reflecting their social responsibility.

For the new science communication phenomenon in China, by looking into four representative scientists, including Zhong Nanshan, Zhang Wenhong, Li Lanjuan, and Gao Fu, this research will discuss three questions:

1. How public medical scientists emerged during the COVID-19 epidemic?

2. What is the difference between their public images?

3. How Chinese scientists became celebrity scientists in the pandemic?

Especially by employing the search data from the Internet, this article illuminates how they become the public figure through media exposure. To give insight into their public images, we analyzed answers and comments(N=1094) regarding these four scientists from Zhuhu, one popular Q&A website in China during January 2020 and May 2020. The study found that though the four scientists all became public figures with professional knowledge, people had different views, which caused different proportions of political images, scientific images, and individual images. Zhong Nanshan and Zhang Wenhong become "celebrity scientists" (Fahy& Lewenstein,2014; Fahy, 2015) in China, and they respectively had a high percentage of political images and individual images.

In previous studies, Chinese scientists as a celebrity have been under-explored. This research fills the gap though examing celebrity scientists in China's cultural context and concludes that political identity and engaging personality make celebrity scientists emerge under the health crisis's circumstance, elucidating the distinct relationship between scientists and the public in China.

Wei Hong
Tsinghua University, China

Yimeng Wei
Tsinghua University, China

803 Visual presentation

What will happen when primacy effect and negative inclination coincide and conflict? Based on research on sequence of various statements with different attitudes of a controversial scientific issue--Graphene

Xi Cheng
Soochow University,Suzhou, China, China

When people have formed an opinion towards a new technology, it tends to be rather stable – even in the light of new challenging information. It is therefore important to study how the initial information about a potentially controversial innovation is processed by people unfamiliar with it. Our paper deals with the influence of the sequence in which positive, negative and neutral information on a technology is presented on resulting attitudes. A literature review revealed that two psychological effects might influence the development of a fresh attitude: the primacy effect claiming that the kind of information encountered first has a particular strong impact on the resulting attitude, and the negativity effect claiming that information critical to the technology has higher weight in attitude formation than information on its advantages. We are currently conducting an experiment to determine the combined impact of these two effects. With the experiment we aim to answer the general research question: Are the impacts of different sequences of positive, negative and neutral information on attitudes towards an unfamiliar technology compatible with the predictions of the primacy and negativity effect? For the experiment we recruited students from Soochow University, China, and varied the sequence in which we introduced positive, negative and neutral information about the technology to them between six experimental groups, measuring the strength of association of positive and negative beliefs with the technology as dependent variable. As object of the opinion-forming process we use geoengineering, a technology to counter global warming by inserting certain aerosols into the atmosphere, which is still rather unknown to the Chinese public but is likely to lead to controversies in the future. Our poster will present our hypotheses with their rationales, the research design and first results of the analysis of the experiment.

1041 Individual paper

The Challenge of Science Communication in Thailand: past, present and future

Saowanee Chinnalong
Sukhothai Thammathirat Open University, Thailand

This presentation aims to propose a challenge of communicating science in Thailand by examining historical and contemporary situation and suggest its future outlook. The key characteristics of Thai science communication from a historical perspective shows the significant role of Buddhism as an integral tool for Thai elites in encountering the West and the vital role of Thai monarchs in dealing with the Euro-American influence. The contemporary position demonstrations two main parties in the discourse, the government and the middle-class Thai.

The challenge my presentation explores is a mismatch of focuses between the government and Thai public regarding science communication. The disparities contain two layers creating difficult challenge. First, the disparities of interest in science. The Thai government, similar to governments in most countries tends to focus on the economic benefits of science. While the middle-class Thai public are rather interested in another kind of science- contemplative science and science-Buddhism dialogue. The second layer, although both the Thai government and Thai middle-class have indigenized science. However, the Thai government has focused on deploying the concept of ‘Thainess’ and the ‘monarchs’ to construct the identity of ‘Thai science’. By contrast, my preliminary survey drawing on print media and online-discussion forum illustrations that the Thai public expresses an extraordinary high level of interest in appropriating Einstein as a Buddhist thinker. I propose that these differences in foci between these two parties are inherent in the inevitable tension in science communication tends to remain in the future since Thai government has planned to launch more science museums underpin by the ideology of ‘Thai science’ and continued its policy aiming at nation competitiveness and science for economy. While the middle-class’s interested in the science-Buddhism dialogue tended to remain the same since the 1860s through to the current day and likely to continue to the future.

565 Visual presentation

Encountering Artificial Intelligence technology at a Korean science museum

Sook-kyoung Cho
Gwangju National Science Museum, Korea, South

We are in the time of the 4th Industrial Revolution, driven by the new technologies of artificial intelligence and the internet of things etc. One of the functions of today’s science centers and museums is to show how these technologies can transform not only our daily life but also society as a whole. Another function is to show how our participation in technological development and application could change our future.

In 2017, three National Science Centers being 3 years old in Korea, worked together for having a special exhibition under the title of "2030 Future city: Future home, Future street, Future industry". It lasted for a year touring 4 metropolitan cities (i.e. Daegu, Daejeon, Gwangju, Pusan) with many hand-on exhibits experiencing AI and IoT technologies. One of the most attractive exhibits was to comparing the paintings and musics by people and AI technology. Another was a “IoT Tree” having big datum about everything, gave you answers whatever you asked to it. At the end of the exhibition, we asked the visitors what kind of future they want to have and how they would like to react to new technologies. This exhibition had a great success with almost 100,000 visitors (e.g. 20,557 in Gwangu) and 77 times media coverages in TV.

In this presentation, I will introduce some details of the special exhibition with a video-clip and the results of people's survey about the AI and IoT technologies. And discuss the lessons from the first collaborative special exhibition by National Science Centers in Korea with the audience. More than 1/3 of the visitors expressed their views on post-it notes and some worries about new technologies. Overall, most of their answers were quite close to Sustainable Development Goals (SDG) by UN and this result reflected in following exhibition planning.

Sook-kyoung Cho
Gwangju National Science Museum,

814 Individual paper

Science communication Herstories: diversity and inclusiveness. Some reflections on the Greek case between 1970s-1980s.

Evangelia Chordaki
Hellenic Open University, Greece

During the AAAS Annual Meeting 2019, Lewenstein B.C. moderated the panel “A feminist agenda for science communication?” that later led to the publication of the JCOM Special Issue under the title “The need for feminist approaches to science communication”. The main concern of Lewenstein and his colleagues was to stress the aforementioned need by highlighting questions regarding the effects of social discrimination in science communication and thus in the production and circulation of knowledge.

Sharing the same concerns and especially that of the sociopolitical aspects of appearance and disappearance of knowledge, the current research will present the case of Greek feminist birth control movements between 1970s-1980s.

The second half of the 20th century was marked by major social movements and political events throughout Europe and the US, while within the Greek context, the fall of the Junta of the Colonels in 1974 was a crucial historical moment for the wider political landscape. The transition from the dictatorial regime to the following democratic period allowed feminists to gain visibility, reclaim their bodies and communicate scientific ideas regarding abortion and contraception.

In that sense we will argue that feminists’ engagement with the circulation of knowledge transformed science communication and stressed its inclusive and diverse character that was apparent in their identities, practices, spaces, medias and materialities. Moreover we will show that women developed an experience based expertise through communication, that co existed for almost two decades with the dominant scientific knowledge within the Greek public sphere.

Our analysis aims to point out that feminism is not only a perspective of science communication through history but has also been an internal part of it that reveals the intersection of complex realms of circulation and production of knowledge and requires multidisciplinary approaches.

1162 Insight talk

Managing the first wave of Covid-19 pandemic in Greece: Communication, Epistemic Uncertainty and Expertise.

Evangelia Chordaki
Hellenic Open University, Greece

While Covid-19 crisis is taking place in the post truth era, where emotions and beliefs appear to be stronger than facts in accepting arguments, as a global health crisis shows that “scientific expertise is back on high demand”

Sotiris Alexakis
National and Kapodistrian University of Athens, Greece

Melina Antonakaki
National Technical University of Munich, Germany

Stathis Arapostathis
National and Kapodistrian University of Athens, Greece

Manolis Patiniotis
National and Kapodistrian University of Athens, Greece

1023 Individual paper

"The science is not settled": an analysis of pro- and anti-vaccine rhetoric on two South African Facebook pages

Karien Connoway
Stellenbosch University , South Africa

The World Health Organisation identified vaccine hesitancy as one of the top ten threats to global health in 2019. Facebook in particular has come under fire for inaction regarding the spread of vaccine-related misinformation. The risks associated with inaccurate health information, and misinformation, shared on Facebook are well established globally. In addition, global political events have demonstrated the immense power of the new "digital public sphere", which has transformed how people communicate and share information.

We set out to gain a better understanding of the nature of pro- and anti-vaccine rhetoric as it emerged on two public Facebook pages that identify as South African "“ one in support of vaccines and one opposed to vaccines. We wanted to understand what claims were being made, how they were supported, and which sources the pages relied on. To do this, we conducted a content analysis of posts over a 12-month period (January to December 2019) on both pages. Our findings indicate that 1) the majority of the content is not specific to South Africa, 2) personal stories are often shared, and 3) both pages position themselves as "pro science" or "pro knowledge" and rely on research to support their claims. Despite this, strong themes of alienation and distrust in science emerge on the anti-vaccination page.

Our aim was to use these pages as a lens into wider vaccine-related discussions on Facebook in the South African context. Our findings provide valuable insights into broader issues around trust in science in South Africa and could inform new science communication strategies around vaccines on Facebook in the future.

This work was done pre-Covid-19. Vaccine debates have flared up globally in the context of large scale Covid-19 vaccination programmes. It would therefore be meaningful to do a follow-up study comparing 2021 rhetoric with our findings from 2019.

Hannah Keal
Stellenbosch University, South Africa

697 Visual presentation

Equations Stripped with the Naked Mathematician

Tom Crawford
University of Oxford/Tom Rocks Maths, United Kingdom

Maths is boring, stale and takes itself too seriously. At least according to the results of my survey amongst friends and colleagues working in education. On hearing this, I made it my mission to change that, and with it the 'Naked Mathematician' was born.

In this visual presentation I will perform a shortened version of one of my 'Equations Stripped' talks where I strip back equations (and myself) layer by layer through a series of transformations. The idea is to explain complex mathematical concepts in an entertaining and exciting manner to try to combat the stereotype of a mathematician. The subject here will be the million-dollar Navier-Stokes equations, with the added bonus that the stripping allows me to reveal my tattoo of the equations to the audience.

Through a visual presentation at PCST 2020 I will be able to introduce my innovative approach to science communication to practicing researchers, with the hope that they will use the opportunity to suggest potential research avenues based on my work. As far as I am aware, I am the only science communicator trying to engage their audience through this method, and as such I would be very interested to hear from practicing researchers about the kind of information that I could collect from my audience that would be beneficial to further research into its effectiveness.

Alongside my role as a science communicator, I also hold a teaching position at the University of Oxford where I hold tutorials with the mathematics undergraduate students at 3 colleges. For more examples of my work please see my award-winning website www.tomrocksmaths.com. Videos of the 'Equations Stripped' series are also available on YouTube here: https://www.youtube.com/watch?v=xp3J_uSYtD8&list=PLMCRxGutHqfkQzAwdIL9H9I69Z-vBC5i5.

695 Demonstration

The Naked Mathematician

Tom Crawford
University of Oxford/Tom Rocks Maths, United Kingdom

Maths is boring, stale and takes itself too seriously. At least according to the results of my survey amongst friends and colleagues working in education. On hearing this, I made it my mission to change that, and with it the 'Naked Mathematician' was born.

In this demonstration I will perform a series of acts from my 'Naked Mathematician' talks where I strip back equations (and myself) layer by layer through a series of transformations. The idea is to explain complex mathematical concepts in an entertaining and exciting manner to try to combat the stereotype of a mathematician. The stripping also allows me to reveal my many mathematical-themed tattoos which themselves form part of the discussion. Topics covered include: the most beautiful equation in maths, Plato's theory of the universe and the unsolved problem with a million-dollar prize. After each act there will be an opportunity for discussion and feedback from the audience on what they have just seen.

As a practicing science communicator, I am eager to try new and creative methods to engage my audience. Whilst my performances as the ‘Naked Mathematician’ are generally well received by the audience, the opportunity of a demonstration at PCST 2020 would allow me to discuss my thought process with those working in science communication research and learn from their feedback on my methods.

As far as I am aware, I am the only science communicator trying to engage their audience through this method, and as such I would be very interested to hear from practicing researchers about the kind of information that I could collect from my audience that would be beneficial to further research into its effectiveness.

Please see my award-winning website www.tomrocksmaths.com for more examples of my work, including videos of the 'Equations Stripped' series (direct link to YouTube videos: https://www.youtube.com/watch?v=xp3J_uSYtD8&list=PLMCRxGutHqfkQzAwdIL9H9I69Z-vBC5i5)

899 Individual paper

Science Profile: a refined tool to identify and include science content in journalism

Javier Crúz-Mena
National University of Mexico, Mexico

The climate crisis has brought together ample sectors of civil society the world over to demand that politicians "listen to the science". This battle cry could be carried over to other global crisis: antibiotic resistance, environment migrations, food security, energy transition, etc. For the average citizen, an obvious way to "listen to the science" ought to be through the press. Thus, the science content of the news becomes a relevant topic for research, both globally and locally.

We have developed a tool —the Science Profile— that helps in both academic and journalistic research. The Profile works by identifying any or all of a set of 8 relatively easy to recognise features representing scientific content.

We present here results of the tool applied to study the science content of more than 50 pieces from newscasts of public TV in 4 countires. We have identified some intriguing patterns (a blatant inclination to include magnitudes, an unequal ability to offer emprical evidence and explanations), but our data also suggests that a small increase in time invested per story could yield a disproportional increase in science content, if oriented by the Profile.

Evidence from the use of the Profile as a planning tool by science reporters points towards a transformative new methodology for journalistic research (see Abstract for Demonstration by Gómez-Gurrola & Climent: S is within reach...). This methodology is designed to allow reporters (most with no university-level science background) to efficiently use scientific papers and structure journalistic narratives that put the public in a better position to "listen to the science".

We find it convenient that a single tool can be used in academia and journalism, unchanged.

What's new: i) a refined tool for detection of science content in published products; ii) an innovative methodology to better include science content in science journalism.

Research or practice: both

Itzel Gómez-Gurrola
National University of Mexico, Mexico

Claudia Hernández-García
National University of Mexico, Mexico

905 Roundtable discussion

If Generation Like demands to

Javier Crúz-Mena
National University of Mexico, Mexico

Whilst the science community debates whether or not to use the term "crisis" in "climate crisis", or settle for "climate emergency", segments of civil society —#FridaysForFuture, #ExtinctionRebellion and multiple variants— appear to have decided that the signature cry of the next generation is worth heeding: "Listen to the Science". If civil society is just as concerned about the other crisis on the horizon —antibiotic resistance, population explosion, plastic pollution, etc.— then the media to "listen to the science" ought to be the press. However, as some of us have shown (see the Abstract Science Profile, by crúz-mena et al.), coverage of these topics does not often provide much science for the public to "listen to".

A few news outlets have taken the editorial decision of devoting important ammounts of resources to cover climate change, but not necesarilly to the other crisis (and obviously not the the crisis yet to emerge, of which all we know is that they willl very likely happen). Consequently, we propose a paradigm shift for debate: not just science journalism anymore, but rather science in journalism: telling stories with the science content each story needs. Such a shift would impact the practice of science journalism for sure, but also its business model (such as it is) and, crucially, teaching and training at all levels.

The Mexican group brings concrete ideas, but a broader approach is needed to drive a culture shift. Our research results (proposal #899) may be a launching pad, but the bigger picture demands ideas from a kaleidoscope of newsroom ecperience.

We envision a panel of scholars and journalists —all of them confessed consumers of science journalism— to address this particular question: If "listen to the science" is a central demand of upcoming generations, what role should journalism have and how will it play it?

Michele Catanzzaro
Journalist and science writer, Spain

Monica Pelliccia
Freelance environmental journalist, Italy

Aleida Rueda
Mexican Network of Science Journalists, Mexico

Harry Surjadi
RUAI TV, Indonesia

1003 Roundtable discussion

Art, humanities and science: lessons in transformation

Simone Cutajar
, Malta

In 1959 C.P. Snow shed light on the divide between the sciences and humanities. This segmentation is crumbling as concepts like SciArt, BioArt and other trans- and inter-disciplinary approaches have spread around the world bringing scientists and artists together to create groundbreaking research, innovative engagement formats, and attracting new audiences to public engagement activities. This has been coupled with a rise in citizen science and participatory action research. There is solid evidence backing both the benefits and pitfalls of integrating arts and science to engage various stakeholders and parts of society. However, there are a limited number of researchers and practitioners that work with artists. This discussion panel will give examples and deliberate how scientists, artists and citizens have worked together highlighting the barriers that exist on the path to both the research and implementation of initiatives at the points of intersection of the arts, humanities and science.

The structure of the session will be four short introductions followed by a 50-minute discussion panel. The introductions will be based around case studies, literature reviews and impact evaluation studies. The speakers will cover the intersections between: science and community arts, science and arts festivals (theatre and art installations), science and opera, science and illustration, science and performance arts, impact of cross-sectional projects and citizen science. The talks will be followed by a panel discussion exploring the complex relationship between citizens, research and the arts. We propose holding the panel discussion in the form of a ‘fishbowl’ to facilitate participation from the attendees. To encourage further participatory discourse participants will be asked to write down any provocative thoughts and ideas they have during the introductory talks to then be brought in during the discussion. A reflection on the key points will be performed five minutes before the session closes.

Helen Towrie
Central Laser Facility, Science and Technology Facilities Council, United Kingdom

Francesca Scianitti
INFN, Istituto Nazionale Di Fisica Nucleare (Italian National Institute for Nuclear Physics), Italy

Aaron Jensen
Trinity College Dublin, Ireland

700 Insight talk

Twitter to the Stars: Interstellar Transmissions as Engagement and Education

Wilson da Silva
Freelance Science Journalist, Australia

Australia's first interstellar message to a potentially habitable planet beyond Earth was sent in 2009, and is now halfway to its destination. Known as HELLO FROM EARTH, it was a public engagement and science communication exercise that captured world attention, and helped educate people about the universe and the evolution of life.

In August 2009, goodwill messages from almost 26,000 people were transmitted by NASA's Tidbinbilla facility, near Canberra, to Gliese 581d, an Earth-like planet some 20.4 light-years way. In November 2019, that message passed the halfway mark, and will arrive in January 2030 (a decade from this conference date).

HELLO FROM EARTH was an audacious project created for Australia's National Science Week in 2009, designed to generate awareness of the International Year of Astronomy. It was a great success: in a week, messages were uploaded from 199 nations, news stories ran on 1,000+ newspapers and it was linked to by 10,000+ blogs. More than 254,000 people visited the project website, and 28,809 messages were uploaded. NASA was very specific about what could be allowed – no profanity, racism, personal attacks (and no ribald or risqué humour), so we had to manually review and accept each submission.

The costs were remarkably low considering the reach and ambition (less than US$21,000), but required long-term planning and consultation with multiple players. And messages uploaded gave an insight into how people see the world, our species and our place in the universe – ranging from earnest calls for interstellar friendship to gentle humour and banal puns. Some were classes of students asking for alien visits, others took it seriously enough to enter sequences of Pi and Fibonacci numbers.

This presentation will tell the story behind the project, how it came to be and how you go about organising such a mammoth science communication endeavour.

974 Individual paper

Science camps overlooked: a 50-year old science communication practice

Hannah Dalgleish
University of Oxford, United Kingdom

Science camps emerged ~50 years ago in Europe, as a new way of communicating science to younger people. One such example is the International Astronomical Youth Camp (IAYC), which was founded in 1969 and is the focus of this work.

Our research explores the perceived benefits and potential long-term influences of attending the IAYC. 307 participants (181 male, 119 female, aged 16-79) completed a survey consisting of a number of multiple choice and open-ended questions. Quantitative analysis has shown that 68.4% of IAYCers are currently studying or working in STEM-related fields (Dalgleish & Veitch-Michaelis, accepted).

To probe further, new research on the qualitative data suggests that camp attendance has a substantial long-term impact on professional life. Respondents emphasised that the camp influenced a more informed career choice — predominantly in science and technology — and opened up professional opportunities by building solid networks with peers. Additionally, the IAYC's international nature promoted a "global citizen identity" by: 1) encouraging participants to seek careers in international environments, 2) fostering acceptance and interest in other cultures and minority groups, and 3) providing confidence to live and study abroad. Many participants also reported increased self-esteem, self-awareness, acceptance towards self and others, and social inclusion.

Although science camps have become increasingly common practice across the globe, research on this topic remains limited (Lindner et al. 2014). Through comparisons to other formats like science museums and festivals, we find that science camps reach fewer people, but the intensity and prolonged experience of a camp has longer lasting effects and appears to influence future lives and careers more significantly. On the other hand, the IAYC seems to suffer from the same challenges as other practices, namely lack of diversity: such activities typically attract those with higher science capital and socioeconomic status.

Nora Mórocza
Liverpool John Moores University, United Kingdom

661 Insight talk

Science Communication in Egypt: Challenges and Opportunities

Mohamed Daoud
The American University in Cairo, Egypt

The research field of science communication in Egypt is fairly neglected. The university system, with few exceptions, pays scant attention to the teaching of science communication, leading to limited academic knowledge of this research field and the absence of any compendiums covering the evolution of this discipline with its rich history and philosophical relations. Accordingly, this insight talk will be the first attempt to provide a deep reflection on science communication in Egypt.

Firstly, the talk will propose a timeline of the milestones that contributed to the science communication development in Egypt. Interestingly, in spite of its early and promising start around almost the same epoch as in the UK, it has witnessed numerous setbacks. The authors will draw the attention to these setbacks as a result of the economic and political upheaval suffered by the Egyptian society since the French colonisation in the 18th century.

Surprisingly, Egypt has witnessed a true boom in the public communication of science in the last 9 years specially after the January revolution in 2010. The talk will focus on identifying the drivers that led to that sudden proliferation in the field during the last decade, highlighting the landscape of various science communication activities, in addition to the fundamental challenges to its sustainable growth due to the spread of pseudoscience and censorship in the media in one hand and the lack of vision, professional trainings, academic research, and funding on the other hand.

Finally, the authors will mention all the prospected opportunities to improve communication of science under the umbrella of the recently established Science Communication National Network, funded by the government through its Academy of Scientific Research and Technology, and supported by The American University in Cairo.

Mohamed Elsonbaty Ramadan
Freelance Science Journalist and Science Communication Consultant, Egypt

1081 Visual presentation

A comparative study on Science Festivals between the United Kingdom and Egypt

Mohamed Daoud
The American University in Cairo, Egypt

Science Festivals are one of the most recent initiatives in the landscape of the current public communication of science. Although, Science Festival is a good way of Science communication and public engagement, yet little research has conducted to date to investigate this increasingly global phenomenon as a survey conducted by European Science Events Association (EUSCEA) in 2004 described Science Festivals as a ‘relatively new’ phenomenon.

The author aims to provide a generalised model of how to host a successful science festival in developing countries like Egypt, highlighting the challenges that might face the founders and organisers of the event and providing practical guidelines in terms of the scope and its development, financial and operational models, and scale and size of the science festival.

Accordingly, the Author conducted semi-structured interviews to collect data concerning Science Festivals in Egypt and the United Kingdom. The interviewees were representatives from Cairo Science Festival, Egyptian Science Week, Zewail Science Festival, and Manchester Science Festival.

The results of this work prove that Science Festivals are good example of applying the “dialogue” and “conversation” approaches that depend on two-way of communications to engage the general public with cutting-age science and technology. This work has confirmed that there are broad approaches and diversity of the term “Science Festivals.” This work offers further improvements for the relationship between science and society. Finally, this work gives a clear evidence that the public communication of science is growing in Egypt.

The author will present his results highlighting a generalised model with practical guidelines of how to host a successful science festival in developing countries in a form of infographic presentation.

770 Visual presentation

Virtual Reality for increasing the awareness of current scientific research

Laura Daricello
INAF - Palermo Observatory, Italy

In order to increase the awareness of current scientific research also in the youngest segments of the citizenry the Italian National Institute of Astronomy developed 3DMAP-VR project (https://iopscience.iop.org/article/10.3847/2515-5172/ab5966) to visualize astrophysical phenomena in VR.

3DMAP-VR gives the public the chance to visit the space as we know it today and directly interact with current scientific data. In the last months, it had a tremendous impact for dissemination and outreach activities (e.g. the European Researcher’s Night, an invited presentation at the 75th United Nations General Assembly - UNGA75 - in New York, 2 Oct. 2020).

The project also got the Science Spotlight in the Sketchfab community (https://sketchfab.com/blogs/community/modeling-astrophysical-phenomena-at-inaf-oapa/) and videos produced in the framework of 3DMAP-VR, including virtual reality movies and augmented reality, were published on edu.inaf.it.

We produced an e-education lesson, where students interacted with the astronomers, while making a journey inside the virtual environment where a star was forming, or where a star died, or of exotic planets orbiting around other stars.

We published on Youtube (https://www.youtube.com/user/INAFOaPA) and shared on facebook (https://www.facebook.com/astropa.news) a web series made of nine episodes, showing many astronomical environments and phenomena, through VR; followers increased by a factor of ~5 in the last 5 months!

The use of VR for communicating astronomy, provides an immersive experience which enhances the capability of grasping details and extract information. Thanks to the possibility of navigating inside the simulations and interacting with them (literally by using the hands), it is possible to get a sensorial perception of the object under examination.

VR experience, combined with explanatory notes from a professional astrophysicist, is extremely entertaining and concepts are easy to be caught and understood. This approach is particularly useful in case of reduced in presence events due to the ongoing pandemic.

Laura Leonardi
INAF - Palermo Observatory, Italy

Salvatore Orlando
INAF - Palermo Observatory, Italy

Fabrizio Bocchino
INAF - Palermo Observatory, Italy

783 Visual presentation

The Astronomical guide of Palermo: an example of Astrotourism at the INAF - Palermo Observatory

Laura Daricello
INAF - Palermo Observatory, Italy

This contribution intends to present the experience that is currently taking place at the INAF - Palermo Astronomical Observatory in the field of Astro tourism: the publishing of an astronomical guide of Palermo.

This guide is a means to communicate astronomy through art and history, in connection with the needs of the society of the time. It is based on the research work of a scientific consultant, professor Maria Luisa Tuscano, expert of instruments for the measurement of time, and on the public engagement skills for communicating science of the agency Bas Bleu Illustration.

We have identified five itineraries in the city center and several places in Palermo connected to astronomy with a scientific, historical and cultural value.

In Palermo, astronomy has been everywhere, since ancient times, in monuments, frescoes, statues, paintings, historical buildings, sundials, decorations. These elements reveal the fundamental role that the sky has always played in human life and the importance of astronomy in the life of the city and testify and testify the deep connection of science and art.

The aim of the project is to underline the key role of astronomy throughout the time in the life of the city and to push tourists and citizens to discover new details even in famous and wellknown places, when looking at them from a different point of view.

The guide is the third of the series “Second Star to the Right and Straight On!”, after the ones of Padua and Florence, all published by the Italian National Institute of Astronomy and Bas Bleu Illustration.

We are also exploring the possibility to equip the guide with some ICT devices, like augmented reality, to allow access to additional resources and updated information and to develop an interactive mobile app.

Laura Leonardi
INAF - Palermo Observatory, Italy

Maria Luisa Tuscano
INAF - Palermo Observatory, Italy

Chiara Di Benedetto
Bas Bleu Illustration,

769 Linked papers

The landscape of European science communication: A field in transformation?

Sarah Davies
Norwegian University of Science and Technology, Norway

This panel seeks to open a conversation about the status of scholarship and practice in science communication across Europe today. Based on research carried out for the European-funded project QUEST, which explores and tests ideas about quality in science communication and which runs from 2019-2021, it showcases work on the contemporary norms of science communication practice and on the research landscape as a whole. This work focuses on four areas: science communication scholarship (Davies); contemporary science journalism (Wells); social media practice (Zolla et al); and science museum practice (Roche et al). By providing a snapshot of European norms, practices, challenges, and concerns in each of these areas, the panel will open up discussion about the overall landscape of European science communication. What is the 'state of the art' in public communication of science? Are there shared challenges and concerns across Europe and across formats? And does it even make sense to talk about 'science communication' as a coherent set of activities and knowledge at all? **The Contemporary Landscape of Science Communication â€“ what is the role of the science journalist?**

Rebecca Wells
City University of London, United Kingdom

Contemporary science journalism faces many of the same challenges as all other forms of journalism – declining print sales and advertising revenue; the increasing power of digital platforms; rapid changes due to technological innovation. Science journalists, however, face particular challenges in their work. One of these is linked to long debates in the academic literature on science communication about the role of journalists in the communication of science. In this paper we use data from 18 semi-structured interviews carried out in 2019 with participants from 6 European countries involved in the production of science journalism. Drawing on the qualitative analysis of this data we explore the views of participants on the role of journalism in science communication in the context of academic literature on the same subject. We argue that science journalists in the contemporary journalistic landscape are expected to inhabit a variety of roles. This is the case within their journalistic practices, where they are expected to produce content for multiple platforms and formats, from producer to presenter; book author, blogger, podcaster and reporter. It is also the case in their role in society, where science journalists described themselves as both cheerleaders for science, translators of science and science's watchdog. Given concerns raised both by our interviewees and by the literature in this area (Goepfert, 2007; Dunwoody, 2008; Williams and Gajevic, 2013) regarding increasing science PR activity and the reliance of science journalists on it for their content, is it possible for science journalists to continue to inhabit these many roles? If we argue that it is no longer possible then can science journalism still fulfil the obligation that a democratic society places on it? Authors: Rebecca Wells & Suzanne Franks Presenter: Rebecca Wells

Contemporary landscape of science communication on online social media

Fabiana Zollo
Università Ca, Italy

The advent of social media has changed the way in which we access information and form our opinions. Nowadays, news organisations have adopted social media platforms as a means to distribute news and connect with their audiences. Social media amplify users' ability to communicate and provide feedback, thus changing their role in both information consumption and production. Science communication (SC) has not been exempted from such changes, with diverse actors embracing public communication online. This paper aims to make use of massive quantitative analysis to take a snapshot of the current situation of SC on online social media. We consider how social media are used across European countries on Facebook, YouTube, and Twitter, while also considering a diverse range of SC content producers. The final dataset includes more than 700 sources, standing as the largest multi-platform dataset to exist to date, to our knowledge. Based on the analysis of content over time, we show that SC on social media has been increasing over the years. We observe that some countries display a preference to publish cont —climate change, vaccines, and AI— noting that the first two (very controversial) topics reach more people than AI on all platforms, although users interact with AI content more frequently than in the other cases. Our findings provide important insights on the overall landscape of SC on European social media, paving the way towards the design of tailored communication strategies to improve SC quality and effectiveness. Authors: Ana Lucía Schmidt, Enrico Costa, Roberta Villa, Walter Quattrociocchi, & Fabiana

Zollo Presenter: Fabiana Zollo

Science Communication in informal learning environments: The European Researchers

Joseph Roche
Trinity College Dublin, Ireland

European Researchers' Night is an annual, pan-European event first initiated by the European Commission in 2005. Taking place in more than 300 cities across 30 countries on the last Friday of September each year, it is designed to bring researchers closer to the general public, increase awareness of European research, support the public recognition of researchers, create an understanding of the impact of researchers' work on citizens' daily life, and encourage young people to embark on scientific careers. This paper will demonstrate ongoing work to evaluate this event in Ireland over the past six years. As part of the European-funded project QUEST, which explores and tests ideas about quality in science communication, this paper will use the European Researchers\\\' Night event as a case study for exploring the landscape of European science communication in informal learning environments. The QUEST project ultimately seeks to determine the most effective ways to communicate with citizens about science, particularly on the relevant, and sometimes urgent, topics that impact their daily lives. Presenters: Joseph Roche, Laura Bell, and Aaron Jensen

771 Roundtable discussion

Science communication for social change: What does STS have to offer?

Sarah Davies
Norwegian University of Science and Technology, Norway

Over the past decades Science and Technology Studies (STS) has had an important, though contested, impact on science communication research and practice. Concepts such as the ‘deficit model’, public engagement, or co-production (Irwin & Wynne 1996; Jasanoff 2004; Wilsdon & Willis 2004) have been developed by STS researchers and taken up within science communication, substantially shaping the ideas and norms of the field. At the same time, STS interactions with practice and practitioners in communication and policy have often been uncomfortable or fraught with misunderstanding (see, e.g., Balmer et al 2015).

In this roundtable we wish to open up a discussion as to what, specifically, STS can offer science communication teaching, research, and practice. Our aim is to explore how STS knowledge can be productively mobilised to improve science communication – that is, to help work towards science communication that actively aims for and helps achieve positive social change. Three short presentations will relate how the speakers use STS ideas in their science communication oriented research (Felt), teaching (Smallman), and public and policy engagement activities (Salmon). The emphasis will be on the value of (particular) aspects of STS in specific contexts, and on how these aspects can be put to work in practice. The session will then open up to a moderated discussion involving everyone present, examining such questions as: what are the most productive and useful strands of STS work for science communication? What can engaging with STS scholarship look and feel like? And where are STS ideas currently under-utilised, within the context of promoting science communication for social change?

Melanie Smallman
University College London, United Kingdom

Ulrike Felt
University of Vienna, Austria

Rhian Salmon
Victoria University Wellington, New Zealand

754 Individual paper

Transformation of the Media Landscape: Infotainment versus Expository Narrations for Communicating Science in Online Videos

Lloyd Davis
University of Otago, New Zealand

Society is undergoing a transformation in the way people consume media: increasingly we are using online on-demand videos, accessed mostly on mobile devices. The fastest growing segment of online videos about science is User Generated Content (UGC) that uses an infotainment style of delivery, and these videos are proving significantly more popular than professionally generated content that traditionally uses an expository style of narration. Here, we test the effect of an infotainment or expository narration for: (i) engaging viewers and (ii) enhancing their understanding of science.

We produced two identical videos about climate change save for their style of narration: each contained the same information, but one had an infotainment narration; the other, an expository narration. The narrations were available in English and Spanish. We tested 870 participants (419 English; 451 Spanish), who were directed to a website to undertake a survey in which they were randomly presented with either the infotainment or expository version of the video.

We found viewers were significantly more likely to believe the expository narration and liked it significantly more than the infotainment version. This held true for English and Spanish viewers, irrespective of their age, sex, or online viewing habits. However, viewers without a university education liked the infotainment version significantly more.

Notably, viewers of the infotainment video performed significantly better at recalling information than did those watching the expository version, and this relationship was consistent regardless of where the information was given throughout the videos.

In conclusion, the dramatic rise of UGC and its reliance on infotainment is a cultural phenomenon. While generally perceived as less authoritative than traditional expository narrations, the focus on infotainment may actually prove advantageous for science communication by increasing information recall for all viewers and increasing engagement with science by one of the hardest publics to reach: those without a university education.

Bienvenido León
University of Navarra, Spain

Michael Bourk
Gulf University for Science and Technology, Kuwait

Wiebke Finkler
University of Otago, New Zealand

788 Demonstration

Making PCST conferences as inclusive and diverse as possible

Liesbeth de Bakker
Utrecht University, Netherlands, Netherlands

NB: Jenni Metcalfe's message of 9 Jan: I am happy to make this session a formal part of the programme. We can discuss specifically how it is run later. (as a demonstration session / round table or unconference session)

Currently, inclusion and diversity, also referred to as equity in academic literature, are hot topics, be it in terms of social inclusion, accessibility of education, or gender equality. So it stands to reason, as organizers of the next PCST conference in Rotterdam in 2022, that we have inclusion and diversity high on the agenda. It is therefore promoted by a special team, consisting of Anne Dijkstra, University of Twente; Pedro Russo, University of Leiden; Cees Leeuwis, Wageningen University; and Liesbeth de Bakker, Utrecht University. In Aberdeen we would like to devote an online session to new ways of promoting equity in our own PCST conferences. And we are asking for the conference visitors' help, especially those under-represented groups in our PCST family, such as the socio-culturally marginal voices from both global south and north, science journalists, policy makers, and/or certain groups of scholars. We are hoping the virtual nature of Aberdeen will already bring many new ideas to the table.

To kick-start this process, the session will start with five inspirational short pitches by five knowledgeable representatives from areas of the world or fields of professions that are not (so) well represented in the PCST community. They will share their ideas and expertise and finish with a question. After that, we will split into break out rooms with interested participants. In a plenary 25 minute wrap up, all new ideas will be presented. Let's transform our PCST conferences of the future into more inclusive and diverse gatherings!

Sook-kyoung Cho
Gwangju National Science Museum, Gwangju, Korea, South

Esha Shah
Water Management Resources, Wageningen University , Netherlands

Kim Waddilove
Communications Officer SANTHE, Durban, South Africa

Karina Omuro Lupetti
Project Olhares, Federal University of Sao Carlos, Brazil

Mohamed Elsonbaty Ramadan
Freelance Science Journalist and Science Communicator, Egypt

878 Visual presentation

A science-shop experience for the co-creation of scientific knowledge

Daniela De Filippo
Carlos III University of Madrid, Spain

Citizen science has become a new way of conducting research by integrating several social stakeholders in the process of producing scientific knowledge. In this sense, the science shop is an initiative that, although it emerged in the 1970s in the Netherlands, has renewed interest in its ability to engage different stakeholders to work in solving local problems. Thus, from the collective identification of different social needs/problems, strategies are put in place to transform them into research questions and find solutions.

The objective of this presentation is to show how our experience in science shop initiatives has been used to solve the problems of its environment. The case of study that is going to be analyzed is the newly created science shop at the Carlos III University of Madrid, under the HORIZON 2020 project “Enhancing the Responsible and Sustainable Expansion of the Science Shops Ecosystem in Europe”.

The experience and methodology developed in this science shop, whose theme is environmental sustainability, will be presented, emphasizing the mechanisms used for the co-creation of knowledge. Lessons learned in this framework are going to be presented. One aspect to highlight is the integration of the science shop in the dynamics of the university and its insertion in a transversal way in the organizational framework of a Higher Education Institution (HEIs). Likewise, integration has not only been structural but, at the content level, the science shop has joined the challenge of working with/in the university in the achievement of certain Sustainable Development Goals (SDGs).

One of the conclusions obtained from this experience is the positive assessment of the joint work between diverse social actors for the resolution of local problems, as well as the change of perception of these actors about their transformative potential and their real possibilities of co-creation of scientific knowledge.

Nuria Bautista-Puig
Carlos III University of Madrid, Spain

María Luisa Lascurain
Carlos III University of Madrid, Spain

Elías Sanz-Casado
Carlos III University of Madrid, Spain

1048 Insight talk

Matemorfosis: Communicating Mathematics in Guanajuato, Mexico

Paulina de Graaf Núñez
Centro de Investigación en Matemáticas, Mexico

Matemorfosis is the outreach group of the Centro de Investigación en Matemáticas, one of the principal Mathematics research centers in Mexico. The main objective of the team is to transform the negative perspective of Mathematics that is usually socialized in various contexts -formal and non-formal. With this on mind, Matemorfosis carries out a series of actions within the state of Guanajuato that vary in terms of content, public, scenarios, and formats.

These actions include organizing and participating in Math festivals in urban and rural communities; daily, weekly, and monthly workshops at schools of all levels; communitary sessions with children, teenagers and adults; teacher training in Math Communication strategies, among others.The contents and formats of the workshops involve hands-on activities that allow us to communicate mathematical ideas to a especially diverse public. Moreover, it is highly relevant for the team to work directly with vulnerable and marginal communities, so that people from those communities have access to a different way to approach Mathematics.

The aim of this proposal is to reflect on and share some of the most relevant actions that Matemorfosis has implemented in order to fulfill its main objective and contribute to the development of Mathematical culture in Mexico.

Rocío González Sánchez
Centro de Investigación en Matemáticas, Mexico

Marco Antonio Figueroa Ibarra
Centro de investigación en Matemáticas, Mexico

Berta Gamboa de Buen
Centro de Investigación en Matemáticas, Mexico

Carmen Delia Mares Orozco
Centro de Investigación en Matemáticas, Mexico

768 Individual paper

Traditional communities' knowledge and formal scientific knowledge: how activists use modern science to empower environmental speech

Diogo de Oliveira
Universidade Federal de Campina Grande, Brazil

Centuries before modern science, humankind developed many ways of understanding nature. The accumulated knowledge and its practical application in ordinary life as habits that endure over the years make part of the cultural heritage that traditional communities bring to contemporary life. Many indigenous tribes and traditional communities have been extinguished but many others still survive, especially in Latin America, in the Amazon Forest Region. Living in preserved areas and struggling against powerful industrial, mineral and agricultural companies, activists in traditional communities combine their traditional knowledge with data and analyses drawing on formal scientific knowledge to create arguments for shaping public opinion. The combination of traditional knowledge, practical knowledge, and academic knowledge seems to be a particularly powerful way of constructing potent arguments. Traditional knowledge is also a source for research companies and universities as they conduct their studies; but their use of principles discovered by minority populations is sometimes criticized as expropriation. Our paper investigates these relations and points out the importance of combining local knowledge with formal scientific knowledge to convince global citizens about the realities of socio-environmental conflicts. This paper is part of a project of understanding socio-environmental conflicts through the perspective of science communication.

Bruce Lewenstein
Cornell University, United States

544 Roundtable discussion

Science Communication and Socio-Environmental Conflicts

Diogo de Oliveira
Universidade Federal de Campina Grande, Brazil

According to the Environmental Justice Atlas, in April 2019, there were 2776 active Socio-Environmental Conflicts worldwide. The actual number is probably larger. NGO's, academics, science journalists, and policymakers are some of the actors involved, making issues of science communication key to understanding the conflicts. The issues are diverse - from nuclear to land conflicts, from mineral ores to fossil fuels. The Global Witness reports - from 2002 to 2018 - show that at least 1733 persons were killed in socio-environmental conflicts. Again, because of obstructions to accessing data, threats to denouncers, and many other reasons, the real numbers are also certainly larger. This alarming amount of people killed and the environmental damages that they were struggling against, reflect the failure at many scales of many agents in this complex scenario. Discussing and reducing these numbers is a challenge for science communication, one of the common interest to environmentalists, academics, journalists, and politicians.

Jean Ann Bellini
Comissão Pastoral da Terra (Pastoral Land Comission), Brazil

Anaid Olivares
National Observatory of Environmental Conflicts, Mexico

Bruce Lewenstein
Cornell University, United States

766 Visual presentation

Activism in Latin America: the role of science communication and NGOs in socio-environmental conflicts

Diogo de Oliveira
Universidade Federal de Campina Grande, Brazil

This insight paper explores how to study a topic relatively rarely discussed in PCST research: the place of NGOs in public communication of science and technology. To do so, we use an example from Latin America where science communication, environmental activism, and social movements interact. The paper draws on data from NGOs about how they use science communication as a tool for telling stories about environmental conflicts that frequently turn violent. According to the NGO Global Witness, almost 1600 land and environmental activists in Latin America – mainly peasants, indigenous people and members of traditional communities in conflictual areas -- lost their lives between 2002 and 2018, almost three times the rest of the world. The main goal of the paper is to understand the use of scientific storytelling by NGOs and activists to defend their point of view and to influence public opinion towards their position. We used multiple methods: Textual and quantitative data is drawn from the formal reports of four NGOs - Global Witness (United Kingdom), Pastoral Commission of Land (Brazil), Editorial Board (Colombia) and Mexican Center for Environmental Law (Mexico). We also conducted semi-structured interviews with representatives of the NGOs about their use of science communication.

Bruce Lewenstein
Cornell University, United States

720 Visual presentation

The revision of the International System of Units and the challenge to communicate it: the Brazilian case

Aline de Oliveira Coelho
University of Coimbra / Inmetro, Brazil

The objective of this study is to present the review of the International System of Units (SI) and the promotion of its updates in Brazil, under the responsibility of the National Institute of Metrology, Quality and Technology (Inmetro). In times when relationships and media are increasingly virtual, it is opportune to analyze Inmetro's dissemination strategies focusing on direct communication using social networks, particularly Facebook.

In November 2018, Metrology (the science of measurement and its applications) took a historic step: the approval of the redefinition of four (out of seven) units of measurement on which it was based: kilogram (mass), ampere (electric current), kelvin (thermodynamic temperature) and mole (amount of substance). The revision is based on fundamental physical constants, considered stable and immutable, and using quantum phenomena as the basis for universal units of measurement.

This process required an unprecedented joint campaign to publicize these changes, coordinated by the International Bureau of Weights and Measures (BIPM) to 'translate' and disseminate the information of this transition and its effects to the public, composed mostly by citizen-consumers and industry representatives. Despite some obstacles such as the election period in Brazil, Inmetro's communication initiatives have proven to be efficient, which is demonstrated by expressive reactions, comments and shared posts. They were analyzed by quantitative methods (content analysis) in which a numerical value was assigned for each type of reaction, which generated value for each post and allowed them to be classified according to their repercussion. The results are presented by visual resources, such as infographics.

Décio Ruivo Martins
Coimbra University, Portugal

Claudia Jurberg
Fiocruz, Brazil

Carlos Fiolhais
Coimbra University, Portugal

716 Insight talk

Science stars on Twitter: impact of the public discourse

Elena Denia
Polytechnic University of Valencia, Spain

The perception of science is a social aspect studied extensively over the years, nevertheless there exists some criticism about the traditional methodology of questionnaires. The present work takes advantage of the real-time nature of the open data available in the internet, which can provide unexplored dimensions of the public interest in science. In this paper we intend to answer the following research question: what type of information generates more or less interest in the popular scientific discourse? To do so, we focus on Twitter's public discourse of two science stars –Neil DeGrasse Tyson and Elon Musk– and analyze the content of representative sets of tweets by using data mining techniques, with the purpose of exploring the main concepts that play a key role in terms of laypeople interest. The impact of the information is computed in terms of retweets and likes, and measures of popularity and polemicity of the information are suggested. The study contemplates the weights of different kinds of information classified by categories –science, culture, politics & social, belief, media and emotional– when communicating science, and the results reveal that a transmission of emotional charge awakes a substantially deeper response in the public. We also investigate co-occurrences of words in a semantic network by visual representation to assess the grade of centrality of most attractive concepts, and such a visual analysis of the word network indicates that the peripheral concepts to the scientific discussion show greatest interest, and not the central ones in the discourse. The study is limited to the context of space exploration, therefore it does not answer the generic question about whether science interests, so it is open to a comparison between fields.

1040 Insight talk

Urban living lab as an interactive platform to improve knowledge communication, and accelerate transformations

Gabriela Di Giulio
University of Sao Paulo, Brazil

For the past years researchers have paid increasing attention to the challenges in producing knowledge more readily accessible and relevant to policy and society for achieving transformative pathways for sustainability. Several approaches have been tested as a means to facilitate this process (mostly affiliated to Action and Intervention Research frameworks), endorsing that collaboration and co-learning allow researchers to better design interventions in order to support evidence-based policy. While these approaches shed light on the fact that extended dialogue and transparency can enable stakeholders to understand to what extent information can be applied, there is still limited evidence of their potential to accelerate just and equitable urban sustainable transformations. The Urban Living Lab (ULL) methodology can help to fill this gap. The ULL is described as a forum for innovation, applied to the development of new products/systems/processes, employing methods to integrate researchers and stakeholders into the entire development process as users and co-creators, to experiment/test/evaluate new ideas, scenarios, concepts and creative solutions in complex and real contexts. Furthermore, the ULL provides an interactive platform to identify key issues affecting the locality, knowledge gaps, foster bilateral cooperation, and combine co-design/coproduction/co-dissemination of knowledge to solve fundamental issues to achieve sustainability. The ULL methodology is currently being used in the Glocull project, located in the megacity of São Paulo, Brazil that engages local actors and the scientific community in the co-creation of more sustainable local agriculture practices. In this paper we present the experience of the Glocull project, focusing on the knowledge communication aspects of the project. Combining interactive workshops and narrative communication (e.g. forms of multimedia, podcasting), our findings confirm that ULL methodology are more likely to result in research having the societal impact, narrowing the science-policy gap, and creating safe spaces for experimentation to occur.

Fabiano Araujo Moreira
University of Sao Paulo, Brazil

Michele Dalla Fontana
University of Sao Paulo, Brazil

714 Roundtable discussion

Current transformations in the science-society relationship: learnings from practices

Anne Dijkstra
University of Twente, Netherlands, Netherlands

Science-society relationships are continuously changing and transforming. In the current transformations of the science-society relationship, Responsible Research and Innovation (RRI) has become a key concept within and outside Europe. Recently also Engaged Research and Open Science have become important concepts. However, when meeting the needs of society, as is proposed by RRI and other notions, what implications does it bring in practice? What kind of science-society relationship is desired and needed to tackle current societal challenges? And, most importantly for the PCST community, what does that mean for communication processes, roles of researchers and research institutes?

In this round table discussion, we will bring in lessons learned from projects that addressed different aspects of the science-society relationship and include practical and theoretical transformations. We will discuss how learnings from each project help to understand the current changes in science-society relationships and, together with the participants, we will collect and discuss practical recommendations for communicating science, and new roles for researchers and research institutes. All contributions will show challenges as well as opportunities of the relationships' transformations.

The round table management:

A short introduction sets the scene, where upon pitches reflect key learnings from the projects. The main part will be dedicated to discussing in groups different science-society practices and collecting advice for future science communication as well as for roles for researchers and research institutes, which will be reflected on at the end.

In NUCLEUS, responsible relationships with society were explored in e.g. China and South Africa, and learnings for researchers and research institutes were tested in multiple institutes. In GoNano, practical experiences about building longer-term relationships with citizens and other stakeholders around nanotechnology applications were collected via co-creation, while RRING is extending the reach of co-creation in institutional processes by linking RRI with the Sustainable Development Goals.

Penny Haworth
Manager Communications, NRF, South African Institute for Aquatic Biodiversity, South Africa

Lenka Hebakova
Manager research projects, Technology Centre CAS, Czech Republic

Sikke Jansma
PhD student University of Twente, Netherlands

981 Insight talk

Why don't you (g)doodle it? Making health services research more accessible and engaging.

Stefanie Doebl
Epidemiology Group, Institute of Applied Health Sciences, University of Aberdeen, United Kingdom

Health services research teams investigate how best to deliver healthcare and improve people's wellbeing. This often complex, interdisciplinary research can be challenging to communicate to patients, healthcare workers and policy makers alike. Using a creative approach such as doodles (simple drawings) can be one successful communication strategy.

In this presentation, the speaker shares her experiences of using self-created doodles to communicate her research about a life-changing, chronic pain condition to different audiences. An overview is provided about the reasons for using the approach as well as its benefits and challenges. Examples from two recent public engagement activities (a PowerPoint presentation in a pub and an interactive talk while standing on a raised platform in an outdoor public space) are included. Feedback from several audience members accompany the examples. Further, the speaker suggests that doodles can be used to communicate scientific findings beyond the field of health services research.

Doodles offer a unique opportunity for opening a conversation about research and its connection to people’s lives. The approach is relatively easy to learn for researchers, while audiences are able to access science in a more engaging and understandable way. It also promises to be more fun for everyone.

1055 Visual presentation

Transforming healthcare now - one doodle at a time.

Stefanie Doebl
Epidemiology Group, Institute of Applied Health Sciences, University of Aberdeen, United Kingdom

Research stories have the potential to enable real change in people, organisations and society. Many researchers aspire to create a powerful impact through their work. However, it can be a daunting task to tell an inspiring story. The speaker of this presentation shows her unique approach to this challenge.

Being based in an interdisciplinary health services research team, she focuses on patients affected by fibromyalgia, a long-term pain condition, and their experiences interacting with the healthcare system. She had to ask herself how she as a researcher could communicate patient healthcare journeys in a way that would allow her to include both quantitative and qualitative data as well as would leave a long-lasting impression on different audiences.

This visual presentation showcases the speaker's winning entry for a research competition which challenged doctoral students to describe their research in a self-created, single image and maximum 100 words. For the single image, the speaker overlaid an original photograph with over 40 doodles (simple drawings) in a photo editing software. The doodles, which were hand drawn by the speaker, were purposefully arranged to communicate patients' symptoms and their experiences with the healthcare system. They also demonstrated how these patient stories can be used to improve healthcare delivery for people with fibromyalgia. For the text, the speaker applied a creative writing style to describe her research succinctly.

Researchers have many opportunities to tell powerful stories. However, different approaches are needed to communicate patient experiences of health and healthcare, creating an impact which will lead to change.

817 Insight talk

Communicating science in the courtroom

Heather Doran
Leverhulme Research Centre for Forensic Science, University of Dundee, United Kingdom

Members of the public, in the role of jurors, are expected to listen, understand and make judgements in regards to the scientific (and non scientific) evidence presented during a court case and then come to conclusions, beyond reasonable doubt, in regards to the guilt or innocence of an accused person.

Are there ways we could ensure that juries correctly understand the information presented to them? As scientific techniques and their applications become more complex how can we support members of the public to make evidence based decisions? How can we ensure that they understand the limitations of scientific evidence?

The Leverhulme Research Centre for Forensic Science (LRCFS), in collaboration with ex-theatre company, Fast Familiar has explored a world leading public experiment using comics as a ‘scientific primer’ in a piece of particapatpry theatre. Members of the public 'act' as a jury in a mock-trial evaluating the potential to use alternative and creative means to communicate science to enable them in decision making.

In this session we will share what we have created and the interpretations of the research work we have carried out.

LRCFS is a £10 million, 10 year award-winning disruptive research centre with the aim of increasing the robustness of scientific evidence used within the justice system and ensuring that forensic science is communicated correctly and appropriately. The comics have been created with the University of Dundee Scottish Centre for Comics Studies based on interpretations of scientific evidence techniques from judges, researchers and forensic scientists.

Rachel Briscoe
Fast Familiar, United Kingdom

Niamh Nic Daeid
Leverhulme Research Centre for Forensic Science, University of Dundee, United Kingdom

1010 Roundtable discussion

Mentors, Mentees, and Public Engagement

Edward Duca
University of Malta, Malta

The Science Communication profession has expanded worldwide with different theories and approaches being developed across continents. Various institutional and country-wide efforts are being encouraged, through initiatives such as the EU's embedding of institutionalised RRI (Responsible Research and Innovation) and the UK's REF (Research Excellence Framework) programme, to increase research impact, societal involvement, and best practices in the field of public engagement with science.

Public engagement is a field with many entry points and career paths for individuals. Science communication scholars and practitioners come from a variety of backgrounds. As the importance and value of public engagement becomes more widely recognised and professionalised, it is important that the institutions who already have established programmes support those who are less experienced in the field of Science Communication. One mechanism for this support is institutional mentorship, either for public engagement as a whole or in one particular aspect of a public engagement programme. A mentoring relationship with someone more experienced in the field can advance an individual's self-confidence, knowledge and career. This relationship can provide impartial encouragement for the mentee institution, and offers the mentor institution the opportunity to reflect on their own practice. Such mentorship needs to embrace and learn from cultural differences across fields, institutions and locations, in order to achieve the intended impact.

This session will discuss the importance of mentorship to increase the research impact, societal participation of public engagement with science.. The mentee-mentorship relationship will be discussed across cultural boundaries in Europe and India on a personal and institutional level, emphasising the challenges and benefits to all involved. The variety of informal and formal mentoring relationships will also be emphasised through the speaker's case studies that reflect a variety of cultural norms and practices which session speakers will develop through personal experiences in EU projects and other collaborations.

Susan Wallace
Wellcome Genome Campus, United Kingdom

Heather Rea
The University of Edinburgh, United Kingdom

Siddharth Kankaria
National Centre for Biological Sciences, Bangalore, India

Clayton Cutajar
Esplora Interactive Science Centre, Malta

1072 Insight talk

Science, Magic, and Mystery of Time

Miquel Duran
University of Girona, Spain

Our group has been working for a few year in innovative ways to communicate science concepts in all STEM fields using magic as a useful, enticing tool. Moreover, discoveries of our own research groups are being communicated too, partially, with the help of Magic (and its mysteries), using cards, props, science curiosities, awesome experiments or mathematical games.

This communication will address our experience on explaining science concepts involving time to a general audience, according to its definition as a dimension in which events can be ordered from the past through the present into the future, and also the measure of durations of events and the intervals between them. Thus, chemical kinetics (as rate of change with respect to time), catalysis (acceleration), entropy (as equivalent to the arrow of time), and the Solar System, Moon phases and Easter Sunday (as periodic systems) will be analyzed and assessed. Furthermore, we will tackle calendar-related games and tricks, like determining the weekday corresponding to a given date, or relating weekday names to heavenly bodies. Finally, we will provide new ideas on calendar-related games which arose from creating our weekly “52 Games with the Periodic Table” 2019 website.

Audiences have found such games and activities fun, entertaining, and informative. Calendar-related activities attract curiosity by all kinds of participants, no only from those who are especially science oriented. Time involves history, and allows to try to predict the future – actually this is the subject of quite a lot of magic performances.

Of course such practices may be applied not only to public communication of science, but also to science education, However, there are meaningful differences that should be explained elsewhere. We will concentrate on public communication to a general audience. In any case, time is used here too as a blender of different scientific fields.

Fernando Blasco
Universidad Politécnica de Madrid, Spain

Silvia Simon
University of Girona, Spain

1064 Visual presentation

Science communication in nonscience events. New opportunities found in Magic Fairs, City Visits, and Flower Festivals

Miquel Duran
University of Girona, Spain

Public communication of Science is usually achieved within science-related events like Science Fairs, Festivals, Lectures, etc. However, there are other events not specifically science-oriented that may be used to reach a larger population. Our team has been involved in three such cases (connecting Science with Magic): participation in a Costa Brava Magic Fair (communicating science to families), guiding City visits (communicating Science on the spot in Girona, Barcelona, and others), and building Flower exhibits (Rubik's Cube, Periodic Table of the Elements).

All three cases have provided the opportunity to talk about science and techology advances and their social implications, because all three cases connect a large audience (social gathering) for a given amount of time (shorter in the case of a Flower Festival). Moreover, all three provide an urban context that allow to pinpoint history clues, keys to the future of communities, and transformation opportunities, while allowing discussion with the public.

Different fields of Science may be connected in this kind of nonscience events: actually, it is simpler than in Science-related events. This presentation will focus on urban magic&science walks: in a recent Barcelona Walk (Parc de la Ciutadella), we linked mathematics, biology, chemistry, geology and physics. In various Girona Old Town Walks on Magic and Science we led in the last four years, we addressed heritage, mathematics, physics, and chemistry using enticing magic tricks and curious experiments. Participants usually love that approach to local-based Science.

We think that science communication in general, nonscience events provides great opportunity to reach a much wider audience. Our experience from qualitative, impromptu post-event evaluation suggests that participants in science-related events reinforce their beliefs and satisfy their expectations. On the contrary, in general events like City Walks, surprise brings about curiosity for science to individuals and groups that might not consider science interesting enough.

Fernando Blasco
Universidad Politécnica de Madrid, Spain

Silvia Simon
University of Girona, Spain

744 Insight talk

CERN Open Days: going beyond head-counting

Daria Dvorzhitskaia
CERN, ITMO University, Russia

Introduction

CERN (European Laboratory for Particle Physics) Open Days traditionally take place every 5-6 years, attracting tens of thousands of visitors. The key component of this large-scale event is an opportunity for the public to visit CERN's facilities and interact with the CERN scientists, engineers and other members of personnel who volunteer for the event. The communication outcomes of such interactions, however, were never measured systematically until this year, when, for the first time, the implementation of the Open Days was accompanied by a communication-focused research project.

Research questions

This study set out to evaluate communication outcomes of the Open Days through the diversity of aspects. What did volunteers intend to communicate and what did visitors take home as messages? How did visitors' and volunteers' perception of CERN and of each other change after the Open Days? Were the strategic goals defined for the Open Days achieved? How can 'engagement' be understood in the context of such an event? Which new questions about public-scientists interaction does the study raise?

Methods

These aspects were explored by using a combination of qualitative and quantitative methods. Web-based surveys, mainly comprising semantic differentials and open questions, were applied before (summer 2019) and after the Open Days (September 2019). Overall, 6817 visitors (ca. 9%) and 1381 volunteers (ca. 49%) responded to them. In addition, survey data were complemented by structured observations of visitor-volunteer interaction at 97 activities during the event.

Results

The findings will inform CERN's public communication activities, such as future editions of the Open Days, permanent exhibitions, guided tours and social media campaigns. More broadly, the insights provided by this study will benefit practitioners communicating about fundamental physics or for large scientific institutions, as well as researchers evaluating communication outcomes of similar events.

Ana Godinho
CERN, Portugal

Annabella Zamora
University of Geneva, France

Lauren Elwin
University of Geneva, United Kingdom

Leonore Saade-Augier
University of Geneva, France

982 Individual paper

A global perspective on the role of funding agencies in public engagement with science

Michael Ellis
NRF SAASTA, South Africa

Research funding agencies have an important role to play in creating an enabling environment for broader communication and engagement with scientific research. The Global Research Council is a virtual organisation, comprised of the heads of science and engineering funding agencies from around the world, dedicated to promote the sharing of data and best practices for high-quality collaboration among funding agencies worldwide. In 2019 the participants endorsed a State of Principles on Expectations of Societal and Economic Impact and the statement lists 18 key principles in addressing impact expectations and assessing and evaluating the impact of research from the perspective of funding organisations. Building on this statement of principles, the Global Research Council has undertaken to utilise its networks in its five global regions to assimilate best practice information and case studies of how research funding agencies are shaping and transforming the science and society interface. This assimilated information seeks to further guide and strengthen the research funding agencies role in widening participation in research to realise research for all. This paper will present a series of global case studies and a statement of principles on public engagement with science, as endorsed by the Global Research Council, of which the National Research Foundation (NRF) and the South African Agency for Science and Technology (SAASTA) are active participants.

1138 Visual presentation

Soap Bubbles and Vanitas : Mathematicians at the Time of Virus

Michele Emmer
Univ Rome Sapienza & IVSLA, Venice, Italy

Communicating mathematics to the non-experts has proven to be particularly complex, frequently resulting either trivial or non-understandable to most audiences. Soap bubbles provide a unique opportunity, as they are capable of grasping the imagination throughout different age groups and eliciting their interest in mathematics, given that they are at the origin of one of mathematics' contemporary areas, minimal surfaces. They have been studied by physicists and mathematicians. Their structure has caught the interest of biologists and architects throughout the last 100 years. Artists have been fascinated by them since the Sixteenth Century, depicting them as a symbol of Vanitas, reminding the ephemeral nature of human life and the inevitability of death.

The COVID19-caused lockdown prompted an initiative by mathematicians wishing to communicate among themselves and the general public on Maths at the time of corona (Springer-Nature, 2020). This is a reflection on the role of mathematics, the role of purely abstract research and how mathematicians can play a role in communicating their interests and their roles in this dramatic period. Soap bubbles are a stimulating example in this reflection, remembering their link to the theme of Vanitas, symbol of the fragility of human life and their links to scientific research, their stability as surfaces in mathematics, even their being a game for children. In this presentation, I will build on my career-long experience with soap bubbles and soap film, initially from a purely mathematical perspective and subsequently from the perspective of art, cinema (I made a film that was shown at the Venice Art Biennale), architecture, theatre and literature, including courses for future scientific journalists. I will also build on a recent experience in which I curated an exhibition Soap Bubbles, Forms of Utopia Between Vanitas, Art and Science. (March-June 2019). Is it all simply Vanitas at the end of 2020?

Michele Emmer
Universita Sapienza Rome,

975 Linked papers

Public communication of research institutes compared across countries

Marta Entradas
LSE, United Kingdom

Public communication of research institutes compared across countries

In recent years, we have witnessed a growing tendency within academic and research organisations to turn to the public; and it is surprising how little systematic research exists on how this change is taking place. With a few studies that have looked at PR communications offices in German universities, and their influence in scientists' visibility in the media, less is known about what is happening at other levels within organisations; not to mention how the activity is developing across countries with very different traditions, commitments and resources for science and science communication.

In this linked session, a group of science communication researchers, will present first hand empirical evidence on the communication function of institutes/units in eight countries (within research universities and large research organisations), and discuss tensions and challenges for science communication. The findings presented here result from the international study 'MORE-PE- Mobilisation of REsources for Public Engagement' carried out in Portugal, Germany, the UK, the Netherlands, Italy, the USA, Brazil, Japan, and China. This will be the first presentation of the results on a comparative level.

The speakers are:

Paper 1 - Marta Entradas –ISCTE- University Lisbon Institute/Visiting Fellow at LSE

Paper 2 - Martin Bauer – London School of Economics (LSE)

Paper 3 - Giuseppe Pellegrini – Italy, OBSERVA Science in Society

Paper 4 - John Besley/Anthony Dudo – USA, Michigan University/ Texas University

Paper 5 - Asako Akamura - National Graduate Institute for Policy Studies, Japan

An emerging â€œArms Raceâ€ - Resourcing the public communication effort

Martin Bauer
LSE, United Kingdom

The medialisation of science hypothesis (Peters, Weingart et al, 2012) expects a rising presence and public attention to science in the mass media on the one hand, and an over-adaptation on the side of science and scientific institutions to the logic of news values to feed this rising appetite for attention to science. This idea defines a risk of science communication, rather than the communication of risks. A number of trends point to such a potential risk: the construction of careers on public visibility rather than research reputation, a bias for research questions that are anticipated to attract public attention, the shifting of resources from ground research towards communication efforts. In this paper, we will examine the latter of these trends. We call it the â€˜public engagement (PE) arms raceâ€™ hypothesis: in a context of increased competition among research units for limited funds, increasing proportions of funds are re-allocated from the primary task of research to the secondary task of communicating about research. The PE arms race metaphor suggests that this competition creates niches for hypertrophic forms of engagement with little functional relevance beyond market signalling (i.e. a Baroque culture), and because these niches are costly, they might at some point tip into dysfunctionality. Our international project tries to establish baseline data to see where this trend is at, is moving towards and where its tipping point might be. **Predicting success in Public Engagement**

John Besley
Michigan State University, United States

One area of focus within the MORE-PE data is self-reported perceived successfulness of current public engagement efforts and whether current engagement spending is adequate. This paper will describe efforts to explore what other

variables are associated with both types of measures. This will be done in the context of past strategic communication research literature that highlights perceived successfulness as a potential indicators of engagement quality. Initial exploratory analyses using American data suggest that key statistical drivers of perceived successfulness and desire for additional resources include the depth of past engagement efforts along with the availability of engagement experts within a research unit. Discussion will address the degree to which this data provides an argument for putting increased attention on building science communication infrastructure rather than focusing on improving scientistsâ€™ individual-level skills. **A global typology of research institutes on the basis of public communication activities**

Giuseppe Pellegrini
Observa Science in Society, Italy

Within the MORE-PE project, we built a typology of institutes based on the activities they use to engage different audiences. Combining different sets of variables regarding types of communication activities conducted (public events, channels of communication, social media channels), and types of audiences addressed (public and stakeholders), we profile the â€˜communicative actionâ€™ of institutions across countries. Three different profiles are identified, which highlight different sources, channels and formats of communication. **Public engagement in Japan: in pre-history or sunrise stage?**

Asako Okamura
Senior Research Fellow, National Institute of Science and Technology Policy (NISTEP), Japan

With increasing concerns over science and society links, this study reveals how Japanese research institutes are communicating to and engaging with the public. As MORE-PE is the first nation-wide empirical investigation of this kind in Japan, the first objective of this talk is to unveil the structure of science communication (SC) and public engagement (PE) activities from a birdâ€™s eye view, by observing multiple indicators derived from the surveys. The second objective is to detangle complex interactions among different elements which may affect the level of SC/PE activities. Such elements range from scientific fields, size of institutions, to subjective ones including factors of motivation and awareness of research institutions. The third objective is to understand how policies and institutional factors play a role in determining the level of SC/PE activities by research institutions. The discussion will focus on whether Japanese research institutes have gone further beyond just disseminating scientific information to engaging with the public.

822 Insight talk

Nothing in biology (communication) makes sense except in the light of evaluation - The evolution of the Darwin Day

Carolin Enzingmí¼ller
IPN Kiel, Germany

STEM university-led outreach is a key element of scientists' effort to communicate their research. Yet, the question has been raised whether existing outreach initiatives are used to their full potential: Some argue that too little time is invested in examining, discussing, and deciding on what to communicate and why. Others say that even if goals are set, they are not transformed into actual design choices. Furthermore, effective outreach evaluations are still rare and scientists get no feedback concerning the adaption to the target group. We want to turn outreach into a more meaningful experience for scientists and accomplish better outcomes through interdisciplinary collaborations between scientists and educational researchers. In our project, scientists from the Kiel Evolution Center and science educators from the Kiel Science Outreach Campus joined forces to review and advance an outreach event at Kiel University, the Darwin Day. Every year, the Darwin Day attracts about 1200 secondary school students to get insights into innovative research on evolutionary biology. Evaluation results showed that the format is yet effective in informing about evolutionary biology research. In a further step, we now set the goal to improve the format´s effectiveness in raising students´ interest and affective attitudes towards science and scientists. To achieve this, we are conducting interviews with the scientists to specify our perceptions about their expectations and goals regarding the event and collect pre-and-post data on student outcomes. Furthermore, students will serve as "outreach reviewers", providing feedback on how to improve the format and how to achieve the outreach goals. Based on the findings, we will discuss, how the format can be further developed, making it more interactive and engaging for participants. In addition to learning from the evaluation itself, our goal is to see if this project leads to a more reflective approach for university outreach events.

Christina Claussen
IPN Kiel, Germany

Kerstin Kremer
Leibniz University Hannover, Germany

Ilka Parchmann
IPN Kiel, Germany

Hinrich Schulenburg
Kiel University, Germany

1018 Visual presentation

Communicate the science behind environmental issues. Identifying key messages (and other clues) from scientific papers

Clementina Equihua
Instituto de Ecología, Mexico

I will present a methodology that may help journalists, science communicators or even scientists, to identify key messages within a peer reviewed scientific paper. Climate change, biodiversity loss and the wide diversity of today's environmental problems pose an important challenge for science communicators when addressing scientific issues. Second to researchers, scientific papers are a primary source of information for journalists. A scientific communicator can use them as a first approach to identify key messages and then produce the narrative that engages audiences or obtain the needed information for interview planning. Scientific papers are also an invaluable tool since they remain as a legacy in history. Nevertheless, communicators relay mainly on scientists as a source of information. Relaying mostly on scientists may bias the communication process (i.e. some scientists are more open to accepting interviews than others or the communicated science is mainly what is already pretty much understood by the audiences). Then some issues can be left aside, for instance novel information or key issues that help understand better an environmental problem.

My suggested methodology can help overcome those problems and become a useful tool for identifying key messages (and other clues) that may help make science accessible to wider audiences. This methodology will also help to increase the different subjects that are published in the media. For instance, helping to obtain clues to understand papers with no direct relationship with society, but important to help the public to better understanding the acquisition of knowledge.

573 Visual presentation

Scientific research in the contex of epistemology - Searching new practices for scientific research and public communication of science in Peru

Nemesio Espinoza
Universidad Nacional Mayor de San Marcos, Peru

Peru is a country of wealth in terms of natural resources and biodiversity. However, it is an immensely poor country. Under such conditions, the production and dissemination of science in the university, which should be priority activities, are still undeveloped. Considering that in the present times it is impossible to promote the development of societies without science and technology, this paper focuses on raising two binding policies for the university: 1) Scientific research, whose main purpose is the production of science and technology, are priority activities and should be carried out in the light of epistemology; and, 2) Public Communication of Science should be a mandatory activity.

The above approaches have validity considering that in the Peruvian university, highly professionalizing and unscientific, scientific research is not considered as an essential mission and the teaching of Epistemology is non-existent, for which reason science is not produced in the conditions and qualities that modernity demands. As evidence of the latter, the “automatic baccalaureate” culture, consisting in granting a bachelor's degree without a thesis, that is, without research, is still in force for more than three decades. Furthermore, the Public Communication of Science is completely absent in the university. In Peru, of the top four universities in the national rankings of 150, none has a scientific dissemination unit.

Due to the considerations raised, it is necessary to seek new practices in terms of Scientific Research and Public Communication of Science in the framework of a university restructuring process, which should focus on claiming its main mission which is the production of scientific research in the context of epistemology.

824 Visual presentation

Navigating Negotiations in Starting Up and Supporting Living Labs

Ferdoos Esrail
TU Delft, Netherlands

There is a policy call for widening participation of stakeholders in research and innovation to realise more collaborative research and innovation practices, particularly in terms of inclusion of end users and/or citizens. Part of the rationale for this lies in the prospect of the realisation of higher quality research, which is better in tune with societal demands, and economically more viable innovations.

As part of the European research and innovation policy agenda, EIT Health has launched various funding schemes to support the initiation, development and support of Living Labs (LLs). LLs are seen as promising instruments for achieving co-creative solutions for (complex) societal problems, thereby transforming the relationship between science/technology and society. Moreover, they present a new perspective for science communication, which is going deeper than public outreach or involvement: mutual engagement between the ‘general public’ and scientists from the very beginning of an innovation process.

In practice, we observe various kinds of LLs, ranging from (open) test beds for validation of (industrial) innovation to more open academic workplaces for ideation and knowledge co-creation. They also range from virtual LLs without any physical manifestations, to real-life settings in urban neighbourhoods for smart city solutions. While the motives to participate in LLs types of collaboration may seem evident (e.g. citizens who acquire better care through participation in the innovation process in medical technology), in reality actors struggle with, among other things, issues around money, intellectual property, personal/organisational commitment, enthusiasm and responsibilities.

In this presentation we will share insights from a case study revolving around the EIT Health Living Labs and Test Beds project. We will also discuss their relevance for the science communication community, focusing on transformations of science-society relations and the challenges related to realizing ‘research for all’.

Steven Flipse
TU Delft, Netherlands

Maarten Van Der Sanden
TU Delft, Netherlands

840 Individual paper

The Journalist as Philosopher of Technology: Nicholas Carr as Case Study

Declan Fahy
Dublin City University, Ireland

This paper argues that American journalist and author Nicholas Carr has had an influential, but sometimes overlooked, role in contemporary communications about the social implications of technology. With his Pulitzer Prize-nominated book, The Shallows: What The Internet Is Doing to Our Brains (2010), Carr put forward an influential framework for understanding the impact of digital technologies on individual behaviour and cognition. And with his other books including The Big Switch (2008), The Glass Cage (2014), and Utopia Is Creepy (2016), he presented a strongly critical view of the impact of digital technologies on the intellectual formation of individuals and the collective richness of culture. These and other writings have made him an early and lastingly influential critic of the naïve technological utopianism that had emerged from Silicon Valley over the past several decades. This paper presents Carr as a case of a journalist who has been able to undertake such a culturally-important role because of his deep and ongoing engagement with scholarly ideas. His work is marked by a rich integration of ideas from the history and philosophy of technology, the economics and infrastructure of digital technologies, and media theory. Carr has integrated these ideas into a distinct perspective that established him as what The New Atlantis called “a philosopher of technology.” To show how and why he came to occupy this role, this paper takes a historical approach, combining a close reading of his works, interview evidence with Carr, and a rich contextualisation of his ideas within modern technoscientific culture.

970 Individual paper

Success criteria of networks in science communication

Danielle Martine Farrugia
, Malta

What is the added value of analysing science communication networks? Manifold definitions and types of networks exist, depending for instance on epistemic interest, methodological focus, and scale of analysis. These network types are articulated based on their diverse functions. Since some of the main functions of science communication networks is to understand how to engage various stakeholders with science and share information and best practices, a study was conducted by Danielle Martine Farrugia (Science Communicator & lecturer, PhD student, University of Malta) as part of Work Package seven within the “RRING” project [http://www.rring.eu/] [led by Dr Gordon Dalton, supervised by Prof. Alexander Gerber] and her PhD research to understand how these networks are founded and grown, structured and governed.

Science communication is embedded in social structures and driven by forces that go well beyond science: gender, race, class, access to power and other factors. How do these professional networks ensure that their members are engaged? What motivates science communication professionals to join such a network? How relevant are these networks to their members, and why are certain people deciding not to join (or leave) a network? What are the success criteria for sustaining a network that keeps on serving its members and relevant to their members’ needs? While some networks seem to grow, other network perish or cease to exist.

This talk will explore networks with a focus or related to public engagement with science such as Public Communication with Science and Technology (PCST), World Federation of Science Journalists (WFSJ) and International government for science advise (INGSA) and the role these science communication networks serve to its members/potential members.

Alexander Gerber
Rhine-Waal University, Germany

Eric Jensen
Senior Research Fellow, ICORSA, Netherlands

968 Individual paper

Science communication policies for societal change

Danielle Martine Farrugia
, Malta

Governments and other research-funders are increasingly describing formally what they expect, incentivise or even require Science Communication to achieve. Such policies and frameworks, as previously established in Australia, China, or South Africa, take the form of recommendations, regulations or even federal law.

The underlying policy rationale is often to ask to which extent research and innovation respond to societal needs and expectations. Research funding programmes such as “Horizon2020“ in the EU prioritise policies that require researchers to anticipate and address societal challenges through “Responsible Research and Innovation“ (RRI). How do funders expect research to be conducted, and what are the societal priorities? Policies set the tone for the researchers’ need to engage with various stakeholders in order for their projects to be funded. To this end, how are these societal and/or other priorities implemented? What are the different processes by which countries across the globe define how different stakeholders are to be engaged with science, and how is this reflected in the documents, policies, strategies? How do these processes differ internationally? Which impact have they showed?

Danielle M. Farrugia (Science Communicator, PhD student, University of Malta, co-supervised by Prof. Alexander Gerber, Rhine-Waal University) will present common patterns identified in policy documents across different countries (e.g. Australia, South Africa, United Kingdom). Interviews were furthermore conducted based on these common themes to better understand the process of creating these documents. In her PhD she investigates the above issues as part of the “SciComPass“ project. The aim is to compare the policies/strategies/frameworks about public engagement with science and how they require research institutions to respond to societal needs. This paper explores the role of stakeholder involvement in the process of creating these policy and strategy documents and potential risks these documents may entail for e.g. lowering the variety of science communication formats.

Alexander Gerber
Rhine-Waal University, Germany

761 Individual paper

#ClimateStrike: motivations, behaviours and media habits of environmental activist youth

Hannah Feldman
The Australian National University, Australia

Political expression, the environment, and the way we communicate about these two topics is changing dramatically with the warming planet, particularly among teenage citizens. No event in history captures this better than the global School Strike for Climate, a protest movement for environmental action that has seen millions of school aged youth mobilising across events in over 150 countries since 2018.

But how and why have youth assembled in these numbers for such a politicised scientific topic? Who's not attending, and why?

Through focus groups and surveys, this research documents the experiences of 16-18 year olds in urban and regional Australia, discussing with them motivations, behaviours and media habits surrounding their attendance at a local School Strike for Climate event. Where do they hear and talk about climate change and environmental activism? What enablers and barriers do they encounter before participating in a rally? And what motivates them to actually attend or boycott an event in the first place?

Drawing from social psychology, sociology and science communication methods, this talk gives the preliminary findings on factors that influence youth participation in School Strike for Climate. The results presented here are part of an ongoing project which seeks to understand the experiences of young people as they engage with environmental activism, and contributes insight into the shifting way youth make decisions on their political and environmental autonomy in an increasingly digital, warming age.

867 Individual paper

Multiplicity, visibility and readability: the communication of art, science and technology confluence

Laercio Ferracioli
Department of Innovation and Science Outreach/Federal University of Espirito Santo, Brazil, Brazil

During the 2018 National Science Technology Week in Brazil, the National Museum of the Republic-DF Board opened the ACT Exhibition aiming at promoting the confluence between Arte.Ciência.Tecnologia. The artworks included dynamic and immersion elements, with music, artefacts for manipulation and experience with augmented reality. Although the idea that art installs doubt and imbalance as opposed to science, doubt is the archetype of science, coupled with questioning, requires the subject to act to understand this confluence.

The combination of Art.Science.Technology does not mean a myriad of concepts, but a course of surprising discoveries and approaches by an audience with a sense of perception and cognition of scientific-artistic-technological objects, in confluence. However, it’s reading is not trivial: out of a multiplicity of artwork, a wide range of visuality is grasped which leads to the discussion of the relationship of vision and its readability.

What is visible refers less to what has become a visual image and more to that visuality which, through societal play and communication strategies, is recognized as endowed with symbolic exchange value and communicative relevance. Visibility, finally, is only realized at the moment of consumption-reception-codification-interpretation-translation. In conclusion, visibility refers to a visuality that bears readability.

In order to scrutinize the audience experience through the exhibition a sample was interviewed and asked to write 5-or-more words expressing it. Analysis of the collected words with word cloud technique came up with citations such as, “creative”, “curious”. Preliminary interview analysis reveal a surprised audience with manifestations such as “is that art?”, or “where is science in it?”.

These preliminary results point that museums of art might be natural loci to promote the Art.Science.Technology confluence through scientific communication, as the greater the understanding of artistic, scientific, technological and cultural roots, the greater the public's ability to build their own readability process.

Wagner Barja
Republic National Museum - Federal District, Brazil

Gilberto Lacerda Santos
University of Brasilia - Federal District, Brazil

691 Visual presentation

Science communication about the centenary of solar eclipse in Sobral, Brazil

Laercio Ferracioli
Department of Innovation and Science Outreach/Federal University of Espirito Santo, Brazil, Brazil

According to Einstein “The question my mind asked was answered by Brazil’s sunny sky”. On May 29, 1919 photographs of solar eclipse at Sobral, Brazil proved the 1915 Einstein's General Relativity, stating massive bodies deform the fabric of space-time, causing a light beam deviation. It could only be observed through a total solar eclipse. The prediction of this eclipse led scientists to the ideal places: Sobral, Brazil and Príncipe Island, Africa. Africa observations were compromised by a storm.

Considering Sobral Solar Eclipse Centenary, recent publications about gravitational waves and black hole “photographs”, science communication events were organized in Brazil for promoting public understanding of Einstein’s ideas and the historical importance of Sobral Eclipse. In doing so, Einstein's ideas will be natural to future generations who will grow up with them, as Bertrand Russel said, 1925.

This paper reports an activity promoted within Seminar on 100 Years of Sobral Solar Eclipse at Federal University of Espírito Santo, Brazil. Since high school students have only 2-hours-of-physics-per-week and there is a new full-time school politics being implemented with very broad guidelines, a theoretical-experimental elective-course was offered focusing on Science-as-human-enterprise; historical-scientific-chronological analysis of Einstein's ideas; the impact of Sobral observations.

Among other tasks, students built PVC-circular-structures covered with elastane to simulate space-time curvature; light deflection simulators using cardboard-box, highlighter-pen, black-light-bulb; and Einstein's-life-timeline.

Evaluation questionnaires answered at the end and four-month later students were asked to write 5-or-more-words expressing their course experience and to draw solar eclipse sketches. Analysis of the collected words with word-cloud-technique came up with citations such as “informative”, “cultured”, “science”. The solar eclipse sketches revealed distinct representations of space-time.

These results lend support for elective courses proposal for implementing full-time school politics based on Science Communication of recent outcomes for preparing citizens for Science and its impacts in their lives.

Thiago Pereira
State Secretary of Education, Brazil

857 Visual presentation

Over 20 PubhD Coimbra: when science communication renew city traditions

Miguel Ferreira
Centre for Functional Ecology, University of Coimbra, Portugal

"Can you explain your PhD in the pub?" is the question and premise behind PubhD, a British initiative, that began in 2015 filling Portuguese bars with science. In Coimbra, PubhD began in the midst of the SciComPT 2017, the Portuguese Science Communication Meeting. The concept is common: 3 PhD students have 10 minutes to explain informally their project. In all sessions, dialogue is promoted as well as the exchange of experiences.

PubhD Coimbra happens monthly, and was held for 20 editions, attended by 60 speakers and 900 participants. The average age of speakers is 33 years old. 63% of the covered topics were Exact Sciences and the remaining 37% were Social Sciences. The most covered area was Neuroscience (25%), followed by Ecology (10,7%) and Law (7,1%). All the 8 Faculties of the University of Coimbra (UC) were represented in the course of the event, as well as 18 research institutions.

This initiative is already rooted within the city, as it has been bringing in closer UC PhD students and the local community, allowing them to improve their communication skills to non-scientific public, by requiring a constant language adaptation. Moreover, PubhD has promoted the interaction between various research areas at UC, by connecting PhD students from the exact and social sciences in the same discussion site. The multidisciplinary and multicultural aspects are imperative in our sessions. Each session our audience grows more loyal, and questions the researchers about their projects, specially their applicability and impact on society and their daily-life. We are currently considering the following questions: “Should we apply evaluation questionnaires to the audience? How can we motivate PhD students to participate even more? How to captivate and attract other types of public? What can we change?”. We hope this poster presentation helps us discuss these questions.

Marta Quatorze
Center for Neuroscience and Cell Biology (CNC), University of Coimbra, Portugal

Sara Amaral
Institute for Interdisciplinary Research of the University of Coimbra (IIIUC), Center for Neuroscience and Cell Biology (CNC), University of Coimbra, Portugal

Marta Costa
Communications' Office, University of Coimbra, Portugal

Ana Santos-Carvalho
Institute for Interdisciplinary Research of the University of Coimbra (IIIUC), Center for Neuroscience and Cell Biology (CNC), University of Coimbra, Portugal

Fábio Sousa
Center for Neuroscience and Cell Biology (CNC), Center for Innovative Biomedicine and Biotechnology (CIBB), University of Coimbra, Portugal

802 Insight talk

Audiovisual tools in science communication: mapping video abstracts published in scientific Journals of Ecology

Miguel Ferreira
Centre for Functional Ecology, University of Coimbra, Portugal

In recent years the use of video by the scientific community has grown. More and more researchers, communicators, and other players are using audiovisual media to deconstruct complex phenomena, to simplify ideas and to tell their story. An example of this trend is the video abstract. It represents a potential unifying model that could improve science communication to the journal audience but also to the wider public, as it is an accurate but simplified synopsis of the main methods, findings, and the contribution of the study to the field.

Inserted in a larger project that aims to evaluate the global impact of science communication, through the use of video abstracts this work explores Ecology video abstracts at an international level. We identified the video abstracts on 29 scientific journals, based on impact, representativeness and visibility criteria. A data base with 171 videos, from 7 publishers and 17 different channels was constituted. Each video was viewed and analyzed for different parameters. Statistical analysis considering the relationship among these parameters was realized.

Results indicate that between 2010 and 2018 the number of video abstracts increased sevenfold. Despite this growth, there was no solid strategy for disseminating the videos. While most of them are still associated with classic models, such as documentaries, disruptive formats such as animation are the ones that arouse greater interest. Videos that last between 2-3 minutes and that are professionally produced show a significantly higher number of daily views and their papers garnered a higher number of citations per day.

These data will help to develop a model for validating the quality of an Ecology video abstract and provide new clues to the global study of audiovisual science communication for future evaluation in formal and non-formal education, as well as, in other actors and stakeholders.

Betina Lopes
CIDTFF, University of Aveiro , Portugal

Antí³nio Granado
NOVA FCSH, Universidade NOVA de Lisboa, Portugal

Helena Freitas
Centre for Functional Ecology, University of Coimbra, Portugal

João Loureiro
Centre for Functional Ecology, University of Coimbra, Portugal

909 Visual presentation

Science Stand: The role of young people in communicate science and technology in the public school in Brazil

Emerson Ferreira Gomes
Federal Institute of Education, Science and Technology of SÃ£o Paulo, Brazil

This research is an analysis of the works carried out by Science Stand, which is a project for the popularization of science that targets children and adolescents from the public-school system. This project started in a federal institution of basic and technical education in 2017, having as main form of scientific communication workshops, disseminated by high school students, for elementary students of public schools. As workshops they had interdisciplinary character, where scientific themes related to technology, society and environment are selected. The topics covered during the three years of the project were: Astronomy, Biology, Environment, Physics, Chemistry and Society. During the workshops, we highlighted dialogical aspects in the process of science dissemination, using the playful and low-cost experiences, addressing the role of women in science, as well as incorporating elements of pop culture in the science dissemination workshops. A relevant aspect is that the workshops were designed mainly by secondary girls on campus that allowed to reflect on the role of women in the processes of science dissemination. To elaborate the products of scientific dissemination, a systematic was adopted that involves three steps - taking into consideration theories about cultural satisfaction from Georges Snyders (1986); problematizing and dialogical communication from Paulo Freire (2013); and the interaction from Lev Vygotsky. The processes were prepared through the following sequences: Analysis of artistic and cultural manifestations; Didactic formulation for the incorporation of the artistic and cultural manifestations; Playful didactic intervention. We identified dialogical aspects in the process of interaction between the monitors and the students of the elementary school, through interactions that identify the previous conceptions of the students and prioritize the multiple voices of the process, privileging their scientific and cultural interests. In this sense, it was observed cultural satisfaction of students and monitors who promoted the activities of science communication.

Dayane Gois
Federal Institute of Education, Science and Technology of Sà£o Paulo, Brazil

Carlos Eduardo Quintiliano
Federal Institute of Education, Science and Technology of Sà£o Paulo, Brazil

Luís Paulo Piassi
University of Sà£o Paulo, Brazil

1132 Individual paper

Communicating scientific uncertainty during COVID-19: Investigating the use of preprint research by digital media outlets

Alice Fleerackers
Scholarly Communications Lab, Simon Fraser University, Canada

This presentation focuses on the surge in media coverage of COVID-19-related preprint research and the varied approaches digital media outlets used to communicate this uncertain science. Preprints are generally recognised by the scientific community as unvalidated and preliminary, and journalists have been reluctant to cover them because of the associated scientific uncertainty. Yet, COVID-19 seems to be transforming this tendency; uploads of COVID-19 preprints surged in the first months of the pandemic, and their uptake in online media outstripped that of preprints about any other topic. Drawing on literature from digital journalism and science communication, we used an innovative approach combining altmetrics methods with content analysis to identify a diversity of media outlets that covered COVID-19-related preprints during the first four months of the pandemic. These outlets included specialist medical news outlets, traditional news media outlets and aggregators. They often used hyperlinks as citations, with over 90% of stories including a hyperlink to at least one preprint. Devices emphasising scientific uncertainty were rarely used consistently (e.g. mentioning that the study was a preprint, unreviewed, preliminary, and/or in need of verification). Less than half of the stories we analysed contained framing devices emphasising uncertainty, and few identified the research they mentioned as preprint research. Across outlets, “science communication” stories—that is, stories focused on communicating the results or implications of a particular COVID-19-related preprint—were more likely to portray that preprint as uncertain compared to stories using preprints for other purposes (e.g., to cover a wider issue, to support an argument). While evaluating the certainty of scientific findings can be challenging for readers without a science background, readers can at least understand whether research is established or preliminary with the help of editorial framing devices. This seems especially important for global issues with such local and personal relevance as COVID-19.

Michelle Riedlinger
School of Communication, Queensland University, Australia

Laura Moorhead
Journalism, College of Liberal & Creative Arts San Francisco State University, United States

Rukhsana Ahmed
Department of Communication University at Albany, State University of New York, United States

Juan Pablo Alperin
School of Publishing, Simon Fraser University, Canada

730 Demonstration

Diagnosis: kidnapped! Escape game

Ali Floyd
University of Dundee, United Kingdom

The Wellcome Centre for Anti-Infectives Research has a range of missions. As researchers, we make new medicines and technologies to fight deadly diseases of the developing world. As a Wellcome Centre, we want to create innovative experiences that bring our work to life, giving difficult and abstract concepts real world meaning.

We are fascinated by the potential of gamification in this transformation. It offers the potential to engage non-expert audiences with science topics, using elements such as competition, teamwork, continual assessment and narrative framing. It is a hot topic within the science communication community, one we wished to explore for ourselves.

Inspired by the popular escape room format, we have developed a PE activity which consists of a series of puzzles and challenges. With a compelling storyline, it opens up aspects of the drug discovery process. Looking at parasites, chemistry and pharmacology, it explores how they all come together to create new medicines.

We propose to run this escape game for conference delegates in order to share our practice and get feedback from other science communicators. The game itself runs for around 45-55 minutes, depending on how quickly participants progress through the puzzles. We would then spend the rest of the time in conversation. This would include us telling the story of the project's development with our scientists and collaborators.

We are also keen to share our evaluation. As part of the University of Dundee’s School of Life Sciences, we have a framework which allows us to align participants’ feedback with our strategy. We ran a successful session at Engage in 2018 on this, and we would love to share how it is working on a specific project.

Erin Hardee
University of Dundee, United Kingdom

Nathan Glover
Agent November, United Kingdom

Irene Hallyburton
Drug Discovery Unit, United Kingdom

663 Insight talk

Catch 22 - improving visibility of women in science and engineering for both recruitment and retention

Laura Fogg-Rogers
University of the West of England, United Kingdom

There is a significant under-representation of women in STEM which is damaging societal progress for democratic, utilitarian, and equity reasons. However, changing stereotypes in STEM requires a solution denied by the problem – more visible female role models. We therefore argue that science communication has a vital role to play in socially engineering representations of scientists and engineers, in order to change perceptions and stereotypes in STEM.

In this paper we describe outcomes from the 'Women Like Me' project, which aimed to apply lessons from the social psychology literature to support women in engineering. Our previous research indicates how important peer group and mentoring support is for women, providing vicarious experience and changing social norms.

In total, 52 professional female engineers working in industry or research in the West of England region were trained in public engagement and outreach ('junior' engineers with ≤5 years' experience, N=26) and mentoring ('senior' engineers with 5-32 years' experience, N=26). Junior engineers were to carry out a target of three education outreach activities each, with senior engineers providing at least two mentoring sessions to the junior engineer with whom they were paired through the scheme.

By enhancing the capacity and self-efficacy for mid-career female scientists and engineers to mentor others, it is hoped they will generate a more supportive workplace for junior female staff. Providing training for women scientists and engineers in mentoring and education outreach, along with supported opportunities for public engagement, significantly improved the self-efficacy of junior engineers to undertake more public engagement. These social connections will in turn boost the science capital of girls and other minorities in STEM, and enhance their ability to continue in these rewarding careers.

Laura Hobbs
University of the West of England, United Kingdom

662 Linked papers

Act Now: Is the time for science communication about climate change over, or just beginning?

Laura Fogg-Rogers
University of the West of England, United Kingdom

The effects of climate change are now being felt around the world, and yet cohesive and collaborative policymaking to mitigate impacts are moving too slowly. Indeed the latest scientific report from the Intergovernmental Panel on Climate Change has warned that we have until 2030 to reduce emissions and limit warming to 1.5C above pre-Industrial levels.

International protest movements such as Extinction Rebellion are now stepping up non-violent direct action, with a core demand to Act Now. The movement involves several professional groups such as scientists, doctors and psychologists, who have advocated for their peers to move beyond communication[1].

Meanwhile, science communication efforts focus on individuals "“ imploring us to change our personal behaviours to benefit the environment. However, psychological and social research indicates that asking individuals to change their behaviour against the norms of society is at best ineffective, and at worst harmful to the individual through the resulting guilt, shame and eco-anxiety.

In this series of linked papers, we will discuss whether science communication on climate change has failed. Outreach and education are important, but 30 years of advocacy have seen emissions continue to rise. We argue that science communication therefore needs to focus on creating societal change in order to enable and encourage individual behaviour change. We will discuss where this leaves the neutrality of science, and the role of science communicators in direct action.

[1] https://www.nature.com/articles/d41586-019-02734-x

Tensions in the interpretation of â€œengagementâ€ about climate change research

Rhian Salmon
Centre for Science in Society, Victoria University of Wellington, New Zealand

Dr Rhian Salmon designed and led the Engagement Programme of the Deep South National Science Challenge in New Zealand. This was one of five programmes in a $24M, 5-year, cross-institutional, interdisciplinary, mission-led research effort focused on climate change. While it was laudable that Engagement was recognised and funded at a leadership level, several unexpected tensions arose, many of which were related to the definition and expectations of “Engagement”. Community engagement? Industry engagement? Engagement with indigenous communities? Dialogue and participation? Or media and communications? Factual science communication or environmental advocacy?

This presentation will explore the implications of these multiple expectations and definitions. This includes tensions between delivering (and evaluating) a robust and theoretically-grounded engagement strategy with the need to meet (or manage) expectations for ‘outreach’ and ‘comms’ from the science community, government funders, and different publics and end-users. It will also unpack issues associated with connecting a publics-oriented mission with the science research and funding culture at its core.

It will end with some lessons that we believe would be helpful if taken into consideration in the early planning stages of climate engagement from the science sector including (a) explicit articulation and wide agreement around expectations of engagement and its evaluation; (b) a need to build capability in engagement about difficult choices; and (c) a need to set engagement goals that are realistic of practitioners, respectful of participants, and acknowledge limitations of the research process.

Rhian is co-founder and deputy director of the Centre for Science in Society, Te Herenga Waka Victoria University of Wellington, Aotearoa New Zealand. Her research seeks to inform the communication practice of scientists, especially climate scientists, using knowledge taken from other disciplines. She worked closely on this research project with Dr Joanna Goven.

Shape our City - from public engagement to citizen action

Margarida Sardo
University of the West of England, Bristol, Portugal

Dr Margarida Sardo is a Senior Research Fellow in Science Communication at the University of the West of England, Bristol. She was the evaluator for the Shape Our City project, where citizens in Bristol (UK) were encouraged to reflect on their behaviour for healthy urban development, in order to understand the city's priorities for achieving healthy urban development. The project was fully evaluated using a range of different methods such as online questionnaires, snapshot interviews, structured observations and self-reflective logs. Margarida will discuss how to engage with different audiences from marginalised communities, as the project team worked with schools, festivals and community groups to either discuss one or multiple aspects of urban development and how it impacts on our health. She will discuss how Shape our City brought together art, economics and health science into the same space, using a range of creative consultation methods to engage a wide range of city users, both digital and face-to-face. The presentation will explore how art and health science can be used to engage people with issues such as healthy urban development and air pollution and how art can spur people into action or fill them with fear.

830 Visual presentation

Keep Them Keen: The Perils Of Questionnaire Design And How To Help Participants Stay Engaged When Collecting Data

Mark Forrest
University of Aberdeen, United Kingdom

Asking trial participants to complete questionnaires is a well-established facet of data collection for clinical trials. There are plenty of considerations to be made. However, if the process is too complex or time-consuming, the participant may lose enthusiasm and not complete their questionnaires. It is vitally important to keep participants interested, engaged and eager to continue providing their responses throughout the lifetime of the trial.

Keeping trial participants engaged in clinical trials and ensuring those recruited continue to participate presents a significant challenge. The Centre for Healthcare and Randomised Trials (CHaRT) a fully registered UKCRC trials unit at the University of Aberdeen, UK, has a wealth of experience and knowledge built up over nearly 25 years of clinical trial management. In doing so, it has become extremely aware of the importance of utilising different technologies to communicate with participants and provide various ways to access and complete questionnaires, especially when engaging a wide target cohort with different social expectations and technological experience. Good questionnaire design is vital and has an immense impact on the enthusiasm of the participant to continue taking part.

There are many important points to consider and our visual presentation will cover a variety of key subject areas as highlighted by our conference poster. Topics will include: communication methods; participant experience; form design, layout and navigation; question design and implementation. We’ll provide valuable insight into specific approaches and methods you can utilise to keep members of the public engaged in the process of providing data in as painless a way as possible.

Brian Taylor
University of Aberdeen, United Kingdom

Mark Forrest
Mr, United Kingdom

David Emele
University of Aberdeen, United Kingdom

1170 Individual paper

Vaccine Hesitancy Communication during a Global Pandemic: A Case Study of Vaccination Hesitant Facebook Pages during the 2020 COVID-19 Pandemic

Samantha Fowler
Laurentian University, Canada

The COVID-19 global pandemic creates a unique environment for vaccination hesitant messages, within which traditionally vaccine-focussed Facebook pages are used to promote diverse anti-science messaging. Understanding these communities, their messages, and their tactics is vital to producing effective science communication and combatting anti-science ideas that can threaten global health, including currently declining vaccination rates. The complex political and societal influences of the global pandemic further combine with the critical role social media platforms, like Facebook, play in spreading health beliefs. The research explores the posts and comments shared on two prominent, public, North American vaccination hesitant Facebook pages (Vaccine Facts -14,231 followers and Vaccine Choice Canada - 14,187 followers) during the beginning of the COVID-19 global pandemic from March 1 to May 31, 2020 (443 posts and 6109 comments). This research uses a qualitative, semi-emergent design to organize both posts and comments by discussion topic and style. Using an adapted Health Belief Model framework, researchers added additional constructs to provide a snapshot of vaccination hesitant beliefs, including constructs of perceived lack of authority and the use of community-building tactics. Research findings included a description of how the perceived safe spaces provided by these Facebook communities support diverse anti-science beliefs, including anti-mask and anti-physical distancing beliefs. This study also showed that these groups are toxic and violent environments that do not allow for dialogue or differing opinions. This study builds a necessary audience understanding that can inform future science communication initiatives. Vaccines are a critical current and future study that aligns with the conference's theme of "time".

Paulo Monteiro
Instituto Butantan, Brazil

Chantal Barriault
Laurentian University, Canada

1168 Individual paper

The raise and the fall of a rockstar epidemiologist in Mexico

Gabriela Frias Villegas
Nuclear Sciences Institute, National Autonomous University of Mexico, Mexico

The first case of Covid-19 was detected in Mexico the 27th of February of 2020. From that moment on, the person in charge of the management and communication of the health emergency has been Hugo López Gatell, Subsecretary of Prevention and Promotion of Health in Mexico, an epidemiologist and researcher. Everyday, he gave a talk in national TV about the development of the pandemic of Covid-19 in Mexico. During the first few months of the pandemic, he was considered a hero, and he became a media rockstar with high credibility.

More than a year later, the pandemic in Mexico has not ceased. Since the first confirmed case, there have 190 thousand deaths and Mexico became the third country in the world with the most deaths caused by the COVID-19 pandemic. Hence, nowadays people strongly questioned Gatell's strategy, in particular his refusal to recognize that the use of masks is important to control the raise of the disease among Mexican population. Also, him and President Andres Manuel Lopez Obrador have communicated contradictory and even pseudo scientific information, which has caused misunderstandings resulted in an enormous amount of human losts.

In this paper I would like to talk about the raise of Lopez Gatell as a scientist rockstar, and analyze his covid-19 strategy in three moments of time: a month after the first case, six months after the first case and a year after the first case, using as sources the surveys presented by the newspaper El Financiero, the recordings of his daily talks and the media coverage of three Mexican newspapers: El Universal, El Reforma, and La Jornada. With this analysis I would like to show that the communication strategy of the science of Covid in Mexico has been inconsistent and confusing. Moreover, it has caused Gatells credibility to fall.

742 Insight talk

A Model to Communicate Science from Institutes of Scientific Research

Gabriela Frias Villegas
Nuclear Sciences Institute, National Autonomous University of Mexico, Mexico

In the last few years most of the institutes of scientific research of the National Autonomous University of Mexico have transformed the way they share their knowledge, and have created science communications units with the purpose of transmitting the product of their scientists's research to wide audiences. For my PhD dissertation in science communication I did an ethnographic research of some of the communication of science actions created by specialists who work in several Mexican institutes specialized in areas related to physics. I also interviewed those people in charge of the science communication projects to learn about their interests, their goals and the models they were using, if any. Afterwards, I visited 10 science communication of science projects within Institutes, centers and experiments of areas related to physics around the world, to do interviews and ethnographic work.

Once I gathered the information, I analyzed it with tools from sociology and philosophy of science, comparing the results with all the projects I visited. With this knowledge in mind, I created a Dialog Model to Communicate Science from institutes of Scientific research, that recognizes multiculturalism, with the intention of communicating science in a horizontal way, to different cultural groups. In this insight talk I will focus on some of the practical uses of the Dialog Model to Communicate Science that I propose in different settings and the results obtained by applying it with different kinds of audiences, in terms of a more effective appropriation of science and a wider dissemination of knowledge.

This talk is the result of my PhD research about science communication projects in institutes of scientific research, but also about the practical work that I carried out for 10 years, in which I used the Model I propose.

1165 Individual paper

Science Communication and Political Divides in the U.S.

Cary Funk
Pew Research Center, United States

This presentation will look at Americans' trust in scientists since the coronavirus outbreak with an eye to the implications for science communication. Drawing from a series of nationally representative surveys from Pew Research Center, we will examine the growing political differences in public trust in scientists and in beliefs about the threat posed by the coronavirus and the best ways to mitigate the effects of the pandemic. These divides have intensified leading up to the presidential election in which a center-piece issue has been the president’s handling of the outbreak. We will evaluate the extent to which public confidence in public health recommendations and a coronavirus vaccines has shifted over this period and the factors at play in those shifts. Analysis will examine the extent to which political divides over the coronavirus outbreak extend to beliefs and attitudes across other areas of science. Where possible, we will draw comparisons between U.S. public opinion and that in other Western nations. We will discuss ways to bridge political divisions over science and foster public engagement with science.

578 Roundtable discussion

Activists as "alternative" science communicators

Birte Fähnrich
Berlin-Brandenburg Academy of Sciences and Humanities, Germany

Activists (e.g. environmental, health, food, and social justice) compete with other societal actors for public attention and sovereignty over issues and opinions. Some take on roles as “alternative” science communicators in the public sphere (Maeseele, 2009). They use scientifically informed expertise as a social currency (Fähnrich, 2018). Like all communicators of science, activists draw on the “symbolic legitimacy” of science (Cox, 2013) to confer credibility on their claims in the wider social environment. They make strategic use of science to influence political and/or economic decision-making and motivate civic action (Yearly, 2014).

Besides these findings, our perception of and our knowledge about activists as “alternative” science communicators lacks substantial analysis and reflection. The round table offers a platform for exchange and discussion on this topic by focussing especially on the following three themes:

Interrogating assumptions related to what is labelled ‘alternative’/advocate, academic framing of scientists‘/advocates‘ roles and issues as socio-ecological problems

The impact, democratic legitimacy, and relevance of ‘alternative’ science communication for science communication and society

The problems and opportunities associated with activists’ perspectives in relation to the discipline for which they are advocating

Session attendees will first discuss these themes in three break out rooms. To inspire the discussions, there will be two lightning talks per group. Finally, groups will report on their conclusions in the plenum and consider future directions and potential follow up activities.

Chairs
Birte Fähnrich (Berlin-Brandenburg Academy of Sciences and Humanities, Germany)
Michelle Riedlinger (Queensland University of Technology, AUS)
Emma Weitkamp (University of the West of England, Bristol, UK)

Jane Gregory
University of Cambridge, United Kingdom

Simone Roedder
University of Hamburg, Germany

Susana Herrera Lima
Universidad Jesuita de Guadalajara, Mexico

Ivan Lukanda
Makere University , Uganda

Louise Windfeldt
University of Copenhagen,

Hannah Feldman
The Australian National University, Australia

692 Insight talk

Science for Everyone

Francesca Gale
Connecting Science Public Engagement, United Kingdom

Research has shown that a shortage of women working in science and technology could be exacerbated by gender discrimination taking place early on in life. Children are being influenced by gender-based beliefs as early as 4 or 5 years old. Teachers can play a key role in challenging these narrow views in the classroom before they become too entrenched. There is also an impact on the gendered expectations and awareness of career choices that start as young as 8 years old, with boys more likely to be interested in jobs related to the physical sciences and girls in those related to health/biological sciences. There are also socio-economic influencers in career choices.

Science for Everyone is a pilot programme for Primary school teachers raising awareness of unconscious bias and stereotype threat in the classroom. The programme includes a training workshop and tool kit with bespoke STEM bias tests around gender, ethnicity, and class, career cards for students and teachers highlighting diverse and gender-balanced roles in the science sector as well as the relatable skills and characteristics of the individuals in those roles. The toolkit is supported by classroom resources that encourage teachers to set challenges that build science capital and encourage non-stereotypical experiences around STEM.

The Insight talk will discuss Science for Everyone and the experiences of the first cohort of participants taking part in the programme.

This session is not about Science Education, rather it is about how experiences in a child's formative years can be such an early influencer for perceptions around science and technology.

641 Roundtable discussion

Science recreation workshops: establishing communities and developing networks

Miguel Garcia-Guerrero
Autonomous University of Zacatecas, Mexico

Science recreation workshops (SRW) are widely used as a means for public communication of science and technology (S&T) that promotes a three-level interaction for participants: physical, intellectual and emotional. People experience S&T first-hand as protagonists that explore their interests, discover amazing things, perform experiments, build devices, and discuss their ideas. In this sense, SRW serve as cornerstones for communities of practice around S&T, involving different kinds of fellows that help each other in their learning and understanding processes.

Other than will, commitment and proper training, SRW do not require many resources to develop. The use of cheap (or reusable) materials, versatility on the spaces where they can work (classrooms, museums, parks or even streets) and the ability to include all kinds of publics, help them reach places where other means cannot go.

So far the scholar discussion about SRW has been modest, but this has not stopped the development of networks of institutions working with this means for the public communication of science and technology. Such collaborations provide opportunities for interaction and discussion that foster larger communities of practice, where experienced members help the advancement of newcomers; who, in turn, provide fresh perspectives that help improve workshops. All of this strengthens professional development for SRW.

This roundtable involves experiences from Colombia, Spain, the United States, and Mexico, and explores the possibility of creating larger international collaboration networks for SRW practitioners.

Questions to guide the discussion:

What were the main challenges to start the SRW activities you perform?

What is the role of SRW in the process of building communities in your activities?

How did you achieve collaborations with relevant allies?

Do you feel a need for a theoretical foundation that supports the development of SRW?

Is there a need for international collaboration around SRW? What are the benefits that could be achieved from this?

Luz Helena Oviedo
Parque Explora, Colombia

Jordi Diaz
University of Barcelona, Spain

Curt Gabrielson
Community Science Workshops, United States

859 Visual presentation

Chain reactions for science communication

Miguel Garcia-Guerrero
Autonomous University of Zacatecas, Mexico

The Science Museum at the Autonomous University of Zacatecas has a long tradition, of 36 years, of public communication of science activities that include visits to its exhibits, lectures, temporal expositions, and science recreation workshops. At first, the efforts were intended for the local community in the city of Zacatecas but in the 1990's we started working to reach communities on different towns in our state (Zacatecas has the size of Belgium and Netherlands combined). Soon we realized that our team, consisting of 3 hired science communication practitioners and 30 volunteers, was too small to reach 1.5 million people distributed in 77 thousand square kilometers. We had to try a new strategy, one designed to establish new science popularization programs all over the state, which could lead to further activities for the public.

Our goal was to start a chain reaction: train new teams to perform science communication activities in the inner state, which in turn could get more people -and sites- involved in these efforts to reach a growing number of places and people in Zacatecas and other states of Mexico. We used science recreation workshops, interactive activities where participants get to manipulate, discover things and discuss their ideas, as the main engine for this effort.

In order to develop the aforementioned chain reaction, we looked to collaborate with several organizations (schools, cultural centers, museums, public libraries, science councils, and volunteer groups), through different projects that include a traveling science museum, different science recreation kits, as well as our latest endeavor that will establish 30 permanent Science Clubs in our state (in addition to 8 in other sites in Mexico). This paper will address the mistakes, experiences, learnings, and challenges we have taken from our journey.

Bertha Michel-Sandoval
Autonomous University of Zacatecas, Mexico

Miguel Garcia-Guerrero
Autonomous University of Zacatecas, Mexico

Viridiana Esparza-Manrique
Autonomous University of Zacatecas, Mexico

786 Roundtable discussion

Engaging the Public through Open Science - Putting theory into practice

Helen Garrison
Vetenskap & Allmänhet , Sweden

The drive towards Open Science means ensuring that citizens are involved in research, and that the views of different stakeholders are taken into consideration when shaping science agendas and research projects. But putting this into practice is not always as easy as it might appear in theory. So how can researchers, policy makers and research funding bodies successfully engage with the public, and ensure that citizens" values and interests are taken into account when shaping research agendas?

This session will showcase a range of innovative methods and activities for engaging the public in the research process through Open Science from around Europe. Examples include co-creation formats and methodologies, citizen science approaches, gamification, and public and multi-stakeholder dialogues on topics ranging from genome editing to sustainability. It will also draw upon insights from a number of studies across Europe investigating public attitudes towards research and public interest in getting involved in science. Discussion will focus on the challenges of widening participation in research and ways to overcome these plus how to adapt activities online to support virtual engagement. All participants will also be able to share their own views and experiences of putting open science into practice.

The session will start with short introductory presentations from each speaker on the different innovative public engagement activities performed and the conducted surveys. This will be followed by group discussions with the participants around the following questions:

- What are the challenges of public engagement with science?
- How can the public be involved in science; what methods/solutions can be used and which are the drivers?

All participants will be able to share their own views and experiences in the roundtable discussions providing a broad international perspective. Participants will first discuss each of the questions and the findings will be reported into Mentimeter, an online tool that enables the results to be displayed instantly. The results will then be discussed in plenary and can be incorporated into action plans on how public engagement activities can lead the way to make science and research more open and inclusive.

Maria Hagardt
Vetenskap & Allmänhet, VA (Public & Science), Sweden

Emma Martinez
Babraham Institute, United Kingdom

Pedro Russo
Leiden University, Netherlands

693 Roundtable discussion

Three principles from the book Communicating Science. A Global Perspective

Toss Gascoigne
Australian National University, Australia

The book collects accounts of how modern science communication has developed in 39 countries. Eleven rank outside the top hundred in per capita wealth, and five are Muslim-majority countries. Five are from Africa, seven from the Americas, 11 from Asia and the rest from Europe and Australasia. We have 39 reports from 115 authors.

Three principles emerge from these stories.

The first is that community knowledge is a powerful force. In rural Kenya, the number of babies delivered by unskilled people led to high mortality. Local science communication practices provided a solution. A baraza (community discussion) integrated the health problem with social solutions, and trained local motorcycle riders to transport mothers to hospitals. The baraza used role-plays to depict the arrival of a mother to a health facility, reactions from the health providers, eventual safe delivery of the baby, and mother and baby riding back home.

A second principle is how science communication can enhance the integration of science with other beliefs. Science and religion, for example, are not always at odds. The Malaysian chapter describes how Muslim concepts of halal (permitted) and haram (forbidden) determine the acceptability of biotechnology according to the principles of Islamic law. Does science pose any threat to the five purposes of maslahah (public interest): religion, life and health, progeny, intellect and property?

The third is an approach to pursuing and debating science for the public good. Science communication has made science more accessible, and public opinions and responses more likely to be sought. The “third mission”, an established principle across Europe, is an expectation that researchers will contribute to the growth, welfare and development of society.

Discussants: Toss Gascoigne (editor), Bernard Schiele (analyst), Margaret Kaseje (author) and Joan Leach (Editorial Board).

Chair Michelle Riedlinger (Editorial Board and chapter author).

Bernard Schiele
UQAM, Canada

Margaret Kaseje
Professor & Director of Research and Programmes, Tropical Institute of Community Health and Developm, Kenya

Joan Leach
Australian National University,

811 Individual paper

When exhibits come back to life - How to implement Virtual and Augmented Reality in Museums

Andrea Geipel
Deutsches Museum, Germany

New technologies, such as Virtual Realitiy (VR) and Augmented Reality (AR), not only point the way to science communication in the museum of the future, but also sharpen the view for everyday challenges in the analogue and digital realms. These are precisely the challenges that cultural institutions are facing in an equal measure. With the opening of the VRlab in August 2018, the Deutsches Museum created an experimental area in the exhibition space to test various scenarios of digital communication and education and to identify measures for their implementation.

As part of the national project museum4punkt0 the Deutsches Museum, together with seven other institutions, evaluates and documents questions on digital storytelling, usability and infrastructural requirements when implementing digital technologies. Within the VRlab the Deutsches Museum applied ethnographic fieldwork, 20 in-depth interviews as well as a questionnaire (n=367) to uncover how skilled visitors already are in using VR, how they perceive the virtual exhibits, the contextualization and the storytelling and how they evaluate usability and accessibility.

Our evaluation shows, that around 16% of the visitors have already experienced room scale VR before coming to the Deutsches Museum, around 92% want to learn more about how VR works and around 87% want to see and learn more about the real exhibits. Together with detailed documentation, the talk will give insights in the implementation, virtual storytelling and reception of VR and how therefore, it is more than another media station. In a next step, we will take a closer look at educational concepts and learning outcomes in VR.

In the talk I will highlight why VR should never be seen as a replacement for real exhibitions but rather as another promising tool to give context, add information and bring exhibits back to life.

1137 Individual paper

Public Perception, Myths, and Communication in Turkey During COVID-19 Pandemic

Sevinc Gelmez Burakgazi
University, Turkey

In this survey research study, which was carried out over time at the national level, it is aimed to obtain information about the sources of perceptions about the COVID-19 pandemic. The main data collection tool was a questionnaire developed by the researchers. The data was collected in April and in May 2020 (the very first months of outbreak and the restrictions) via Google Forms to see how things might have changed. The survey was disseminated through social media, primarily Whatsapp and Telegram groups. Within the scope of this research, it is planned to determine society's perceptions about COVID-19 during the pandemic period, the ways people accessed information, and the reliability of the resources they used to obtain that information. The results indicated that people mostly preferred television to access information during the pandemic period, followed by institutional websites, Twitter, communication applications (WhatsApp, Telegram etc.) and Instagram. In both stages, it was seen that the individuals mostly trusted scientists in accessing reliable information. Participants had a common belief that scientific research led to far more benefits than harms. One of the most remarkable results of the study was public believed that COVID-19 was a biological weapon. In the last part, with open-ended questions, participants stated that the measures being taken around the world were not enough to prevent the spread of the pandemic. Participants commonly stated that people should pay attention to health and hygiene. As well as revealing perceptions during the pandemic, the findings are expected to inform different stakeholders and policy makers by determining the position of society in relation to myths about the virus. In addition, it is thought that the current research may be useful at national and international levels for potential future pandemics, as it reveals the trends for the current pandemic in two periods.

Zeynep Aydogan
University, Turkey

Hamdican Yildirim
University, Turkey

1034 Individual paper

Science communication research: Results from an empirical field analysis

Alexander Gerber
Rhine-Waal University | Institute for Science & Innovation Communication, Germany

Just like other research fields coming of age, science communication is increasingly asking itself which patterns have characterised its development, which topics and methodologies were particularly often used, and what this can tell us about the strengths and weaknesses of the research field. An in-depth empirical analysis has explored exactly these questions. The results were published as a book in spring 2020, which also comprises reflections by the world's leading science communication scholars about the field's future needs and perspectives.

The study triangulates a bibliometric and content analysis of approx. 3,000 journal papers with a multi-stage panel study and a review of grey literature spanning four decades. Quantitative findings from the journal analysis (e.g. about disciplinary contexts or topics, research methods, data analysis techniques used) were discussed in a multi-stage series of qualitative interviews.

This paper will especially explore one of the key findings of the study, namely that research and practice do not take sufficient notice of each other's priorities, challenges and solutions.

1073 Individual paper

What works - and why? How to make 'Evidence-based science communication' a reality

Alexander Gerber
Rhine-Waal University | Institute for Science & Innovation Communication, Germany

Considering how paramount communication is for facilitating the role of research and innovation in developing a more sustainable world, it is imperative that science communication plays its mediating role effectively. This proposed session therefore sets out to explore a vision for a more 'evidence-based science communication' (EBSC), where research and practice take each other’s experiences and insights fully into account, so that the field can become more self-reflective and demonstrably effective. Concrete suggestions for this vision will be published prior to the PCST conference as starting-points for a dialogue within our community.

Based on the assumption that neither scholarship nor practice takes sufficient notice of the other’s priorities, challenges and solutions, the author will approach the topic from exactly those two perspectives: research and practice, obviously with the goal to resolve the presumed 'horizontal' dichotomy, and to discuss the topic rather on four 'vertical' levels: the relevance of research and the accessibility of its findings, the transferability of evidence and the quality assurance of solutions. The issues to be explored, go beyond discussing a potential "deficit of evidence in practice", but are rather a lack of sufficient applicability, mutual appreciation and collaboration. One year after the original Manifesto on EBSC was published, the author will also reflect on concrete plans for institutionalising the transfer between scholarship and practice.

Alexander Gerber
Rhine-Waal University | Institute for Science & Innovation Communication,

612 Individual paper

Science news websites as mediators between scientists and the public

Avshalom Ginosar
The Academic College of Yezreel Valley, Israel

This study addresses one of the challenging topics which Science Communication as a research field attempts to explore, analyze and provide solutions for: how to make science accessible for the general public. Although the information-era enables scientists to directly communicate their scientific work to the public through personal blogs and websites, journalism still plays a major role in mediating between scientists and lay-people. Commonly, it is through science news published on general news websites. However, in this study we investigate a less popular, yet promising, online channel: science news websites, which are studied only to a limited extent. The study focuses on five major science news websites in Israel and aims at understanding their nature and their actual and potential contribution to the public's knowledge about, and awareness of, various scientific issues. In this presentation we address only our first research question: What are the characteristics of the five science news websites, and to what extent do they act and operate as journalistic institutions? To answer the question, we content analyzed each item published on the websites during four months; altogether 395 items. Initial findings show that the only private-owned website has published 44% of the items, while the other four (operated by: a science institution, an environmental research association, and scientist/medical-doctors' groups) have each published 7-20% of the items. The authors comprised of 46% scientists/experts, 18% journalists and 14% others. The text-types are informative/news: 63%; interpretative texts: 19%; opinionated texts and others: 6%. Almost all items were supported by images (80%) and/or video (25%). The published scientific topics greatly vary from climate change to nature-conservation, galaxies, and vaccination. Our initial observation is that although these websites format is very similar to a traditional journalistic formats, the authors and the writing are quite different than these of general journalistic websites.

Tali Tal
Technion, Israel Institute of Technology, Israel

1099 Demonstration

S is within reach of J in ScJ (Science Journalism).

Itzel Gí³mez
Science Journalism Unit at National Autonomous University of Mexico, UNAM., Mexico

In two separate proposals to this PCST conference we have argued that science journalism appears to fall short of its social responsibilities in times of existential crisis (environmental, social, economic, in public health and others; crúz-mena et al.: Science Profile...). But we have also argued that a paradigm shift might be possible to seek that every journalistic story has the science content that the citizens need (crúz-mena et al.: If Generation Like...), and that scholarly research has yielded an innovative methodology that makes this possible.

We propose a demonstration by two young reporters who have employed it to produce TV science journalism on two such crises: attribution science and antibiotic resistance.

The demonstration, designed for an audience interested in the practice of science journalism (but not limited to reporters), shall be interactive. We will present the subjects in the shortest possible story version and right away engage with the public by asking questions relative to the design of journalistic products chosen by the audience. What is an average citizen likely to want to know about this story? What science does this story need in order to be well told? How can one design the narrative so that this science content fits in well with the story? How can one then structure the narrative so that it fits the limits of any particular format? But, crucially, can the reporter be in complete control of the science content, from one story to the next?

Research or practice: both (improved practice from knowledge generated by research)

What's new: An innovative methodology for practicing science journalism not necessarily centered in communicating science per se, but rather in guaranteeing that the science relevant to understanding social crisis is offered to the public in journalistic narratives.

Maricarmen Climent
University of Cambridge , United Kingdom

Javier Crúz-Mena
University of Mexico , Mexico

624 Individual paper

Characterizing engagement in an environmental citizen science project

Yaela Golumbic
University of Sydney, Australia

Citizen science is a collaborative effort of citizens and scientists, where members of the public actively engage in scientific research projects. As such, participants engage in data collection, classification and analysis, leading to both scientific and social beneficial outcomes. A key factor in facilitating wide public engagement with science through citizen science, lies in the diversity of participants actively engaging and participating in projects' activities. Yet, participants in citizen science projects are often addressed as one group, with motivations, benefits and outcomes discussed collectively, overlooking group diversity and personal needs and requirements from participation.

In an attempt to better understand the diversity of participants in citizen science, we describe here a multiple case study aimed to identify motivations and underlying engagement styles of citizen science participants. This was done by examining the motivation, activities and experiences of the most active participants (n=25) in Sensing the Air citizen science project, for monitoring air quality in the local environment, over the years 2015-2018. Using interviews, questionnaires, participation reports, online comments and correspondences with participants, log data from the project website, and participant feedback, we identified five unique engagement styles: the worried resident, the environmentalist, the researcher, the educator and the circumstantial participant. We found that initial motivation for engaging with the project often predicted the activities participants engaged with, their personal outcomes and their overall satisfaction from the project. These finding highlight the need for more diversity and flexibility in citizen science projects supporting participants' individual goals alongside its potential in promoting social impact and facilitating wider public engagement with science.

Barak Fishbain
Faculty of Civil and Environmental Engineering, Technion- Israel Institute of Technology, Israel

Ayelet Baram-Tsabari
Technion- Israel Institute of Science & Technology, Israel

807 Demonstration

Empowering local communities through "Talking Science"

Barbara Gorgoni
University of Aberdeen, United Kingdom

Science Communication increases science capital, curiosity and knowledge, breaking down barriers between academic institutions and local communities. It is also a powerful tool to improve confidence and aspirations and involve these communities in research.

We will discuss how long-lasting partnerships can be established between universities and local communities through science communication projects, and the outcomes for all those involved, looking also at how the pandemic has affected participation and perception of science and how we've adapted our activities accordingly.

The University of Aberdeen has a long-standing relationship with a local charity, Station House Media Unit (shmu) that supports residents in the most disadvantaged areas of the city in media production. In particular, University staff and students work with shmu Youth Media Group (YMG; 10-18 year olds) producing science-based radio shows, videos and podcasts. In 2017 shmu and the University started the "Curiosity" project that successfully engaged young people from the city's regeneration areas in science activities. We recently secured phase 2 funding, which will support a further 3-year partnership enabling YMG to determine the research content of the activities, based on their interest and relevance to their communities. YMG are also co-creating a "Podcast Camp", as part of a research project on public/patient involvement in numerical aspects of research, aimed at developing young people's critical thinking.

We will demonstrate our approach to engaging young people with science and different media platforms and invite young participants to share their experience and showcase their outputs (videos, podcasts and blogs). We will discuss the impact of these projects on researchers, young people, their communities and the University, and how science communication can be used to empower the local community. This partnership also allows a transformation of the relationship between communities and the University, enabling a wider participation of a group traditionally disengaged from research and science.

Beatriz Goulao
University of Aberdeen, United Kingdom

Andrea Spence-Jones
Station House Media Unit (shmu), United Kingdom

Helen Heaney
University of Aberdeen, United Kingdom

812 Individual paper

Between transmitting knowledge and rethinking science in society: practices and visions emerging from Research Institutes' online communication. A survey within the Italian National Research Council.

Valentina Grasso
Italian National Research Council, Institute of Bioeconomy; Consorzio LaMMA, Italy

A decade has passed since the first systematic survey about science communication practices – and the underlying visions of science-society interplay – was realized within the Italian National Research Council (CNR). In particular, the study investigated the aim of outreach activities and their organizational framework; the types of communication practices adopted and the imaginaries of scientists towards science. Results showed a scientific community scarcely involved in public communication activities, interested in “educating the public”, with low trust in non-experts when it came to making decisions about the future of science and society.

Ten years later, the reflections about science communication evolved and the media ecosystem dramatically changed, with the outburst of social networks and mobile applications, strongly impacting also on how science and society interact. Science communication practices and visions developed, oriented to the hybridisation of expert and non-expert knowledge (e.g. RRI, citizen science).

Against this background, in 2019 we promoted a survey to investigate if and how public communication of the scientific network of the Italian CNR has changed in response to technological transformations and to the increasing call for public engagement. The analysis explored the research Institutes’ websites as the primary interface of public communication, through quantitative and qualitative analysis. Even if online descriptions of communication activities may not strictly reflect their actual nature, the type of contents chosen to be published on websites and the frames employed to describe them can be considered as a sensitive litmus paper of the underlying science communication and science-society paradigms. As results showed, communication of science gained some spaces in the last decade, but opportunities opened up by digital technologies seem not to be fully embraced yet, with research institutes struggling between institutional communication and engaging the public, transferring knowledge, and educating the public.

Alba L'Astorina
Italian National Research Council, Institute for Remote Sensing of Environment, Italy

Rita Rita Giuffredi
Italian National Research Council, Institute for Remote Sensing of Environment, Italy

844 Insight talk

Scientist-public interaction: who's transforming whom? How many researchers are aware of the transformation process they go through when interacting with the students?

Valentina Grasso
Italian National Research Council, Institute of Bioeconomy; Consorzio LaMMA, Italy

Many scientists carry out communication activities mainly addressed to school as a one-way approach in which they would transfer scientific knowledge to an uneducated public (deficit model). In the last decades, social sciences scholars have described the relationship between experts and not experts as a more complex process than just “filling empty boxes with scientific knowledge” and define it as a more collaborative relationship, where the public has an active role in sharing and creating new knowledge. This is particularly true when the “uneducated public” is made of pupils. We present some reflections from an initiative promoted since 2003 by some researchers of the Italian National Research Council (CNR) base in Bologna, addressed to pupils of different schools. The initial idea of school lessons aimed at spreading the scientific culture has been the basis for further projects, like “Il Linguaggio della Ricerca” funded by the Italian Ministry of Education (https://ldr-network.bo.cnr.it/), and European projects as “RM@Schools - Raw Matters Ambassador at Schools” (http://rmschools.eu) or "UrBIOfuture".

The researchers involved belong to different scientific areas and the vast majority of them have no background in social sciences or communication and education studies. The idea of “transferring knowledge” to an "uneducated public" is always in the background and influences their communication approach. However, the active and constant engagement with the pupils has transformed the imaginaries of researchers participating, who start to recognize an impact on their work and not only on the knowledge of pupils. Through a questionnaire addressed to researchers who joined the projects, we explored which dimensions of research work have been affected by the interaction with the audiences and how their ideas of the relationship with pupils have been eventually transformed and reframed. The analysis showed how researchers' motivations and outreach visions may vary along with scientific areas.

Armida Torreggiani
Italian National Research Council, Institute of Organic Synthesis and Photoreactivity, Italy

Alba L'Astorina
Italian National Research Council,Institute for Remote Sensing of Environment, Italy

1032 Individual paper

Promotional products augmented reality advertising: transmedia storytelling for science communication

Fei Gu
university of science and technology of China, China

With the development of augmented reality technology, AR advertising has been applied to the design of promotional products in the advertising industry. For some products with scientific and technological content, AR advertising can construct a new mode of scientific communication from the perspective of multi-media channels, multi-narrative methods and multi-audience participation. The immersion, interaction and conceptual characteristics of AR technology help to spread scientific knowledge more vividly. Taking AR advertisement produced by AR advertisement editing platform developed by University of Science and Technology of China as an example, from the perspective of transmedia storytelling theory, based on three dimensions of storytelling continuity, universality of experience and wide participation of audiences, this paper studies the scientific dissemination of AR advertisement for promotion products, and puts forward three suggestions: strengthening audience participation and establishing science storytelling Origin and Construction of Open Platform.Through the way of AR advertisement, the dissemination channel, mode, audience and content of scientific communication have been expanded. At the same time, its dissemination effect has also been improved.

rongting zhou
university of science and technology of China, China

658 Visual presentation

The problem of trust in scicomm: transforming global science communication with adaptive management of local uncertainties.

Carlo Gubitosa
ULB - Université Libre de Bruxelles, Belgium

Trust in science communication is a multidimensional issue affected by local factors and cultural identities not easy to encompass within the definition of “general public”.

To perform an exploratory study of the bond of trust linking global science to local knowledge, we consulted before and after Covid-19 pandemic one pool of experts formed by researchers/academics, journalists and scicomm practitioners based in Italy and Belgium.

A qualitative analysis of feedback provided by this pool in a series of iterative steps revealed a lack of consensus concerning social, cultural, political and environmental factors potentially increasing trust in scientific communication among lay audiences. A similar uncertainty emerged regarding risks and threats undermining trust in scicomm.

A strong consensus, not affected by the pandemic spread, was found about good practices fostering trust in scientific communication, and also about critical topics or scientific domains in which the bond of trust in science communication plays a key role. Nevertheless, a strong disagreement emerged again when asking experts to prioritize these lists of items .

These outcomes and their uncertainty, when put into dialogue with recent literature (where the “understanding of publics by science” is now considered as a resource for the “public understanding of science”) suggest an opportunity for transforming science communication practice, using an adaptive approach to the audience.

Multiple tools and techniques for audience analysis, public segmentation, strategic communication and content framing (available from literature and previous practitioners’ experience) can be combined with information on critical topics and good practices for scicomm emerging from this research.

The outcome is a set of “adaptive strategies” visually presented with the support of comics and infographics, a “toolbox” for practitioners and researchers building trust in science communication upon the knowledge of the public they want to reach and engage.

David Domingo
ULB - Université Libre de Bruxelles, Belgium

660 Individual paper

Comparing Journalistic and Social Media Uptake of Articles Published by The Conversation Africa

Lars Guenther
University of Hamburg, Institute for Journalism and Communication Studies, Germany

While science journalism is in crisis in many countries (e.g., Guenther, 2019) and scientists are increasingly called to make their work publicly visible (e.g., Rödder, 2012; Joubert, 2018), in new media environments (Brossard, 2013) alternative sources for informing the public on scientific topics have become popular (e.g., Brumfiel, 2009). Among them is The Conversation with its Africa Edition The Conversation Africa (TCA): a novel, open-access online platform for science news written by scientists, and edited by journalists. TCA's content is free-to-republish by media outlets under a Creative Commons Agreement. Thus, TCA can be situated in the intersection between scientific and journalistic communication, acting as gatekeeper (Fahy & Nisbet, 2011; Shoemaker & Vos, 2009) and agenda setter (McCombs & Shaw, 1972) for science news. Since researchers have been asked to put more effort into studying alternative online sources of scientific information, the present study delivers insights into TCA's nature as well as journalistic and social media uptake of its content in order to compare TCA's impact on traditional journalism compared to social media engagement.

TCA provided access to metrics for all articles published since its launch in May 2015 until May 2020 (N = 5392). The number of publications per month was steady over time. In total, those articles were written by 3589 authors, with single-authored articles (n = 4390; 81%) and South African authorship (n = 3897; 56%) dominating. Using automated clustering and visualization techniques, journalistic uptake (e.g., republishing by other media outlets) was more frequent for TCA articles published on political topics; social media uptake (e.g., Facebook and Twitter shares) was particularly high for articles on education and academia, as well as wildlife and ecology. Hence, attention for TCA articles as an alternative online source of information about science varies regarding media (traditional journalism or social media) and topics concerned.

Marina Joubert
Stellenbosch University, Centre for Research on Evaluation, Science and Technology, South Africa

Jonathan Dudek
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Daniela Mahl
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Rodrigo Costas
Leiden University, Centre for Science and Technology Studies, Netherlands

1035 Individual paper

Art as Science Communication

Megan Halpern
Michigan State University, United States

This talk will explore growing interest in the new field of art, science, and technology studies, specifically addressing the role of art in science communication. The authors, two editors of Routledge's forthcoming International Handbook of Art, Science & Technology Studies, will provide an overview of the Handbook, and will describe several well known spheres where art and science communication intersect. Using both historical and contemporary examples, we will discuss the unique insights to be gained by examining art as science communication. First we will describe how artworks can make arguments about scientific ideas. For example, shifts in the ways artists visually represent objects of scientific interest can make arguments about the nature of objectivity or about evolution. Similarly, contemporary works in bioart and environmental art make arguments about our relationship with technology and with nature. Next, we describe how approaches to art and aesthetics can inform science communication. For example, Dewey's theory of aesthetic experience can help illuminate the aspects of communication that transcend understanding and explanation, offering a few examples of science communication as an act of expression rather than of explanation. Such a theory foregrounds interpretation and meaning making rather than understanding and attitudes. Finally, we will discuss challenges in the ways art as science communication is often conceptualized. Specifically, many STEAM (Science, Technology, Engineering, Art, and Math), science communication, and informal learning programs instrumentalize art, expecting it to explicate or decorate science, or to enhance scientific explanations. Such practices may be novel, but ultimately may undermine the process of science communication. Conversely, when art and science communication interact in productive ways, interactions between the two can give rise to questions about the nature of art and of science.

Hannah Rogers
University of Strathclyde, United Kingdom

1062 Insight talk

Acts of expression and Expressive Objects: Practicing Science as Experience

Megan Halpern
Michigan State University, United States

In this paper, I introduce a model of science communication as experience using examples from my work facilitating collaborations among artists and scientists and developing public engagement events and workshops. These examples illustrate three principles for practicing science as experience: experience is cumulative, context matters, and audiences have agency. I investigate the ways approaching science as experience might inform or transform how scientists and science communicators develop projects. Using Dewey's theory of aesthetic experience, I discuss what it means to express, rather than explain scientific ideas, and how such expressions lead to meaning-making, rather than information retention. The results of these expressions, which Dewey calls expressive objects, invite audiences reflect and interpret meanings. I focus on how to use the experience model in practice, suggesting a process designed to help practitioners explore science communication as an expressive act. Beginning with what Dewey calls impulsions, deep rooted needs to express something that is personally meaningful, the process builds expression iteratively, through interaction with the world and reflection. By focusing on impulsions and expression, the process reorients the act of communicating science from focusing on what audiences need to know or understand to what we, not as scientists or communicators, but as humans, need to say. This reorientation opens space for the ways audiences interpret science communication messages, and for meanings to emerge from the relationship between the expression and the ways it is experienced.

1052 Individual paper

Transforming the Way We Talk about (and Do!) Mathematical Science Communication

Anna Maria Hartkopf
Freie Universität Berlin, Germany

With being the M in the STEM acronym, mathematics is well represented in science communication. However, (pure) mathematics has its own branch of outreach activities.

Analysis of the semantics of mathematical science communication literature reveals an omnipresent "lack of appreciation“ for their field that is felt by mathematicians . "Popularization of mathematics“ and "raising the public awareness of mathematics“ are goals explicitly set by mathematical societies and unions around the world. Rarely are these objectives precisely defined. We take a close look at the beliefs, assumptions, and purports that can be found at the foundation of articles about mathematical science communication and point out common themes that indicate a perception which aligns with the outdated deficit model. Mathematical societies still aim to enhance the situation by educating the public about mathematics' importance and beauty.

We propose new definitions for objectives of mathematical outreach, such as „public awareness of mathematics“ or „mathematical literacy“ that open the door for more participation and a dialogical approach. Because science communication is a practice more than a theory, we present best practice examples and impulses towards a more inclusive and eye-level realization of mathematical science communication projects.

880 Individual paper

How do the EU and US communicate about policy issues that rely on science?

Marlit Hayslett
University of Virginia, United States

Imagine hearing on the news that a long-trusted food product was suddenly found to be harmful: Would you serve it to your family and friends? It's a tough question. As seekers and creators of knowledge, we should ask "where is the scientific evidence that this food is now harmful?" However, what if there is no research? Or if the available research is genuinely disputed? In this situation, it's often better to be safe than risk harming our loved ones. This reticence is known at a societal level as the precautionary principle: Better safe than sorry. Policymakers may employ this principle when they are unsure about the effects of a product. To counter precaution, policymakers may turn to science as a way to evaluate the risk.

With more than $600B in annual trade, the European Union and the United States are the world's largest trading partners. The EU and the US vary in their levels of (pre)caution towards products that depend on science to help inform public policy. Why is this important? If one jurisdiction is more cautious, it may complicate and even impede trade relations thereby jeopardizing businesses and jobs.

The current study contributes to the science communication literature by comparing how the science was communicated in EU and US policy documents on three topics that rely on science for decision-making: Cyclamate, an artificial sweetener, banned in the US but available in the EU; hormone-treated beef, available in the US but banned in the EU; and bisphenol A banned in baby bottles in both the EU and the US. More than 100 policy documents from 1969 to 2018 were evaluated for statements of risk and how the ultimate policy was shaped by the scientific research, among other attributes. Preliminary findings suggest important differences in the US and EU policy-making processes.

656 Demonstration

Training Future Scientists: The Role of Analogies in Science Communication

Marlit Hayslett
University of Virginia, United States

The guiding principles of communicating science are well-known: know your audience, simplify your writing, avoid jargon, etc. As an instructor of science communication at the University of Virginia, I have learned that while we know what we should do (e.g. reduce jargon), we are lacking teaching methods for actually doing it. We tell our students over and over that they should “know their audience”, but unless we provide them with specific techniques or models, they are unlikely to be successful. What do I mean? For example, business schools often rely on the case study method to help students learn business strategies. Engineering programs use problem-based learning to teach students how to analyze the situation before rushing to a solution. These pedagogical frameworks do not exist for research communication.

To address this challenge, I have been building a portfolio of lesson plans for the accepted principles of science/research communication. In this proposed demonstration, I will lead a session on how to craft an analogy to explain a complex concept. We intuitively know that comparison is a helpful tool for explanation, but how do we actually do it in a systematic, thoughtful way? In my teaching, I have developed a “recipe” for crafting an analogy. This session will include 1) the lesson (40 min) 2) Q&A about the lesson (15 min); and 3) an open discussion about how to build pedagogical resources for science communication (20 min). One possible long-term goal from the session would be to create a collaborative team to work on a textbook and/or website for teaching science/research communication.

815 Roundtable discussion

Communicating their own research: What do we need to know about the role of scientists and researchers in science communication?

Friederike Hendriks
University of Münster, Germany

In this round table session, we take a cross-disciplinary look at scientists who engage in the communication of (their own) science and research. In the last years, scientists have been more actively involved in science communication, as scientific research itself is becoming more and more transparent, science communication does increasingly take place online, and outreach activities at universities are relying on scientists to communicate their science.

This increasing involvement of scientists in science communication raises interesting questions for science communication researchers. For example, the speakers in this round table session have investigated which motives researchers hold to engage in science communication, which different communication objectives may shape the science communication by scientists, how communication objectives are adapted to the event and an anticipated public, how science communication might interact with interdisciplinary communication within large collaborative research groups, and how research on the perspectives of scientists engaged in science communication can inform science communication training. To answer these questions, different theoretical approaches were used, e.g. the theory of planned behavior (Ajzen, 1991), theories related to the field of expert-lay communication (e.g. Clark, 1996), or models of educational reconstruction (e.g. Duit et al., 2012).

This roundtable discussion aims to connect cross-disciplinary and international ideas and findings, discussing which research questions need to be addressed in order to investigate the perspectives of scientists as science communicators. We also want to connect overarching theoretical approaches to address these research questions, reflecting on how different disciplinary perspectives can be useful to this field of research, including social science and communication science (Peters), psychology (Hendriks), and science education (Barel-Ben David, Enzingmüller).

Yael Barel-Ben David
Technion - Israel Institute of Technology, Israel

Hans Peter Peters
FZ Jülich & Free University Berlin, Germany

Carolin Enzigmüller
IPN Kiel, Germany

865 Linked papers

What Makes People Attend to and Trust Science and Scientific Experts in Online Contexts?

Friederike Hendriks
University of Münster, Germany

In current controversial public debates (e.g., about climate change, vaccination), people discuss how the future of our societies and our relationship with technology should be shaped, and many of these debates proceed in online environments. While some people refer to scientific evidence and arguments, and also demand that science–as a system generating relevant knowledge for solving today's problems–should be trusted, others neglect scientific arguments and evidence, or actively voice their distrust in science and technological developments. In this session, we raise the question of what makes people attend to and trust scientific information and scientific experts in online contexts.

The first three papers investigate important factors of how individuals seek online information and which experts they perceive as trustworthy. Landrum et al. investigate the influence of gender and science curiosity on accessing scientific content on YouTube; Sharon et al. focus on the influence of an information seeker's personal stance toward a topic for trustworthiness ratings of experts during information seeking in forums; and Yeo finds that not only a humorous presentation, but also source expertise explains how much people perceive comedy a valid source of scientific information. The final two presentations more broadly investigate factors that might benefit individuals' acceptance of scientific information and trust in science: Flemming et al. introduce refutation texts as a means to enhance the acceptance of uncertainty in scientific communication, while Taddicken et al. investigate with a representative survey how individuals' trust, knowledge and online use contribute to their problem awareness of climate change.

The Role of Gender and Science Curiosity in Watching Science on YouTube

Asheley R. Landrum
Texas Tech University, United States

Asheley R. Landrum, Dan M. Kahan, Dan Chapman, Othello Richards, Kristina Janet, Matthew Motta, Sevda Eris, Craig Rosa, Gabriela Quirós, Sue Ellen McCann. A number of professional media organizations create educational science videos for platforms such as YouTube. Though they make these videos for everyone who is curious about science, the videos struggle to gain female viewership. For example, public media company KQED Science produces a short science web series called *Deep Look*. Averaging across episodes, only 16% of *Deep Look*'s viewership is female. Such disparities lead science communication researchers and media professionals to ask whether the content they are producing—and/or the way they are producing it—is inherently off-putting to certain groups. Alternatively, it is possible that such disparities are not attributable to the content at all and are simply due to the ways in which YouTube's algorithm suggests content. Collaborating with KQED, we examined this question with a large-scale survey experiment. Perhaps unfortunately, we replicated the gender disparity, suggesting that it is not simply a consequence of YouTube's algorithm. We also discovered that the disparity occurs in the decision to watch the videos, not in how engaged they were. Although high science curious women were less likely to choose to watch the video than high science curious men, science curious men and women who chose to watch the videos were equally engaged. Furthermore, the decision to watch the video appeared to be conditional on science knowledge. Women who are high in science curiosity but modest in science knowledge were less likely to watch the videos than their male counterparts and less likely to watch than high science curious women who are also higher in science knowledge. Ongoing research seeks to understand this further, testing the extent to which stereotype threat may play a role in this phenomenon.

How do Individuals Evaluate the Trustworthiness of Vaccine Information on Social Q&A Platforms?

Aviv J. Sharon
Technion - Israel Institute of Technology, Israel

Aviv J. Sharon, Elad Yom-Tov, Ayelet Baram-Tsabari. Despite growing concerns about vaccine hesitancy, little is known about the ways individuals seek and evaluate vaccine information online. Here, we explored the factors that predict the perceived trustworthiness of online sources. Specifically, we asked what kinds of questions are asked about vaccines, how often they are directed at experts or parents, and what features of the answers predicted answers' perceived quality and trustworthiness. We analyzed 4,910 questions and 2,583 answers retrieved from two social Q&A platforms: "Yahoo! Answers" and the Facebook group "Talking about Vaccines." Quality was assessed based on the "best answer"

feature and trustworthiness was measured using external ratings of answerers' competence, integrity and benevolence. Findings indicated that on different platforms, vaccine-related questions focused on different topics; questions on one platform focused on the risks and benefits of vaccination, whereas on another, they focused on the vaccine schedule. On both platforms, most questions did not explicitly ask for professional expertise or parents' experience. On "Yahoo! Answers," both pro-vaccine and anti-vaccine answers were proportionately represented among "best answers." However, if an answer was written by a health professional, the askers and the community were twice more likely to choose it as the "best answer," irrespective of its stance towards vaccination. By contrast, an online experiment involving 694 raters of 600 distinct online answers revealed that an answer's perceived trustworthiness mainly depended on the evaluator's stance towards vaccines, and only weakly on answerer expertise. These findings reveal that while askers seldom call for expert answers explicitly, they rate expert answers more favorably. However, readers with low stakes in the assessment (paid raters) prefer answers that confirm their preexisting stances. The findings highlight the importance of open-mindedness and trust in mainstream medicine with respect to vaccines.

Scientists as Comedians: The Effects of Perceived Humor on Perceptions of Scientists and Scientific Messages

Sara K. Yeo
University of Utah, United States

Sara K. Yeo. Humor is an important conduit for public engagement with science and is often recommended for scientists looking to conduct communication activities despite relatively little empirical evidence demonstrating its effectiveness. Here, we examine the social environment of a joke through a two-condition experimental design that manipulates the presence or absence of audience laughter. Specifically, we examine how perceived humor from viewing a video clip of a science comedian embedded in an online survey can have downstream effects on whether people view comedy as a valid source of scientific information. We found that respondents who perceived more humor in the video clip (i.e., those in the condition with audience laughter) had more positive views about comedy as a valid source of scientific information. Interestingly, this relationship was mediated by perceived expertise, not likability, of the scientist engaging in comedy.

Laypeopleâ€™s misconceptions of the tentativeness and credibility of novel scientific findings

Danny Flemming
Leibniz-Institut für Wissensmedien, Germany

Danny Flemming, Joachim Kimmerle. Laypeople, that is, non-experts in a certain scientific domain, have better access to novel scientific findings than ever before. One important source of information are science journalistic articles on the Internet. Novel scientific findings reported in such articles are always tentative to a certain degree, that is, they can be one-sided, blurred, incomplete, or quickly outdated due to constant further development of research (Bromme & Goldman, 2014). Recognizing this tentativeness, distinguishing "correct" from "incorrect" knowledge and dealing with seemingly contradictory findings is by nature particularly difficult for laypeople. It is also affected by various text-inherent factors (e.g., the salience of the tentativeness, the presence of conflicting information) as well as intrapersonal factors (e.g., people’s attitude, epistemological beliefs, or self-efficacy) (Flemming et al., 2015). In addition, there is a seemingly paradoxical empirical finding: the higher laypeople perceive the tentativeness of research findings, the lower they rate the perceived scientific credibility of the text reporting these findings (Flemming et al., 2015). In other words, the better laypeople are informed about the limits of the reliability and validity of research findings, the less scientifically credible they consider what they are reading. Obviously, laypeople hold misconceptions about the tentativeness of scientific findings. One promising approach to resolve these misconceptions is the adaptation of refutation texts. The planned contribution summarizes empirical findings on the phenomenon and gives an outlook on possible solutions for this problem.

Trust, knowledge or online use: What shapes peopleâ€™s problem awareness about climate change?

Anne Reif
TU Braunschweig, Germany

Anne Reif, Monika Taddicken. Today, the Internet as important source of science information offers new opportunities for gaining information about and engaging with science (O’Neill and Boykoff, 2011). For climate change (CC), there are two opposing trends: (a) On social media, even influential politicians claim CC to be a ‘hoax’. On contrast, (b) young people worldwide use social media to organise and strike for a forceful climate policy. Thus, while some online users seem to lack trust, others strongly believe in the truth of scientific knowledge. In line with that, Taddicken & Reif (2016)

argue with different groups of media users. Correlations between media use, knowledge, trust and attitudes may vary across these groups.

The two aims of this study are to (1) analyze how media use, knowledge about CC and trust in the climate sciences are connected to problem awareness and (2) whether and which different effects can be observed for different groups of engaged online users.

Data from a German online user representative survey (n=1,463) was used for an OLS path regression model. The results (1) indicate that trust is the strongest predictor of problem awareness. A more frequent use of online media use is connected to higher trust despite negative effects on knowledge. These effects, however, differ for diverse groups of engaged online users (2). The participating experts (highest online engagement, high procedural knowledge), for example, have the highest trust in the climate sciences despite perceiving scientific results as extremely uncertain. The more they use online media on CC, the higher is their knowledge, without effects on trust. Contrary, for the group of less active unknowing, online use is negatively linked to trust. Which specific information were used by the respondents, however, is unknown, which may be promising to be studied by future research.

897 Insight talk

Interdisciplinary Enhancement of Science Communication

Claudia Hernandez
Universidad Nacional Autonoma de Mexico, Mexico

The opening of Exploratorium in 1969 marked the beginning of a new era in how we communicate science in museums. For starters, phenomena began to replace objects in exhibitions. Also, the deep-rooted museum-school partnership was enhanced as collections' purpose moved from mere objects-of-contemplation to offering interrelated experiences linked to science courses, especially physics. Museums could stimulate curiosity and provide the awareness necessary to develop scientific intuition.

This innovative perspective paved the way for many interactive science museums to come, and it would hardly sound outlandish for anyone who works in the field. A virtual tour to science museums around the world is enough to verify that this standpoint still underpins mission and vision statements. It all sounds great until we stop to ponder: if societies have certainly changed throughout these 50 years, why so many science museums haven't? Explaining how phenomena work, assessing how exhibits enhance education or convincing visitors that science is fun is not enough anymore.

My reflection and presentation will focus on how interdisciplinary handling of information can enrich the planning, production and assessment of scientific contents. To mention an example, topic selection and content development could be more assertive if we were to think more like journalists, philosophers, sociologists and historians since perspective diversity enables us to identify our audiences' real interests. Science understanding and appropriation require that we address issues in regards to its social meaning and relevance, uncertainties associated, plausibility, causes and effects and prediction scopes. Of course, you might say. But in many museums this tends to be overlooked, and only when we take it back into consideration can we begin to improve our science communication practices.

894 Insight talk

Twenty years of research in science communication: challenges and transformations

Susana Herrera
Instituto Tecnológico y de Estudios Superiores de Occidente (ITESO), Mexico, Mexico

This paper presents an overview of the transformations and trends in the topics and problems of research in public communication of science addressed by students and academics of the Master in Communication of Science and Culture of ITESO, in Tlaquepaque, Jalisco, Mexico, throughout its twenty years of its operation.

The distinctive aspect of this postgraduate program is the sociocultural approach for researching and questioning the practice of science communication. This approach considers both, structural and subjective dimensions of communication in society. In this work I identify changes in topics, contents and ways of addressing research problems in public communication of science through time.

I also review the challenges that a postgraduate program of this nature, which studies communication from a sociocultural perspective, has faced to identify, define and rigorously address the research problems that fall within this area, with its consequent turns, transformations and emergencies. That is, how it has been part of the formation of an academic field that is developing, and what contributions it has made from this space of training and research, especially within the Latin American context.

The corpus for the review was integrated with the thesis of the students and the research works of the professors of the Masters, in the line of Public Communication of Science. The emphasis has been on the issues and problems that over the course of these twenty years have attracted the interest of students and academics, or those that have emerged and demanded their attention from CPC research.

The continuities and emergencies in the theoretical and methodological proposals with which the research problems in the projects have been addressed are also analyzed. I expect to contribute to show the panorama of the transformations in a space of professional formation of researchers in CPC in Latin America.

885 Individual paper

Who should have a say? Public perspectives of regulation and policy development surrounding human genome editing

Claire Holesovsky
University of Wisconsin-Madison, United States

Applications of human genome editing have raised moral and ethical concerns. Toward that end, the United States National Academies of Sciences, Engineering and Medicine published a 2016 consensus report calling for broader public dialogue and requiring societal decision-making. Inclusive public dialogue and meaningful public involvement in policymaking about applications of emerging technologies require a clear understanding of how the public views their own role, and that of other stakeholders and organizations, in these decisions. Our research examines factors that predict public acceptance of various stakeholder involvement in regulation and policy formation around human genome editing to better represent the interests of various publics. We analyzed data from a representative survey of 1,600 U.S. adults and a response rate of 41.7 percent. Respondents were asked whether 11 different stakeholder groups should have a say in regulation development. Results identify multiple factors that predict an individual's views as to which stakeholder groups they want to be involved, such as religiosity, science knowledge, and deference to scientific authority. We find that religiosity relates to approval of "citizens" stakeholder group involvement where more religious individuals tend to favor the "citizens" stakeholder group having a say in human genome editing regulation development. In addition, individuals who are more deferent to scientific authority are more likely to want involvement from both scientific and non-scientific experts. Our results suggest that across multiple publics, there is a desire to include a variety of stakeholders in decisions about human genome editing regulations. We discuss implications of our results applied to regulation formation procedures for both human genome editing and future controversial technology. By understanding factors that influence public views on emerging technology regulation, we can work toward better and more effective communication, especially as decisions regarding the regulatory and technological aspects of human genome editing become more imperative.

Dietram Scheufele
University of Wisconsin-Madison, United States

Michael Xenos
University of Wisconsin-Madison, United States

Dominique Brossard
University of Wisconsin-Madison, United States

816 Individual paper

Transforming astrobiology research and innovation: embedding an ethos of engaged research

Richard Holliman
The Open University, UK, United Kingdom

UK Research has been transformed over the past 10 years due to the staged introduction of the impact agenda; initially, as a requirement of applications to public funders, and then as an element of sector-wide research audits. We will begin this presentation with a brief review to explain these changes, drawing on selected theories of epistemology, and the findings from a recent research collaboration undertaken with a UK public funder.

In response to the scale of these changes, UK Universities have been given opportunities by public funders to review and revise their organisational structures and cultural practices to adapt to the increased requirements to engage with ‘publics’ in ways that are meaningful to them. In the second section, we will briefly review the findings and key actions from a project undertaken at the Open University, UK to respond to these changes. These are embodied in our Senate-approved concept of ‘engaged research’, encompassing the different ways that researchers meaningfully interact with stakeholders, user communities, members of the public, facilitating engagement over any or all stages of a research process, from issue formulation, the production or co-creation of new knowledge, to knowledge evaluation and dissemination.

The UK research landscape continues to evolve. In the final section, we will discuss how we have embedded theoretical concepts and practical approaches to promote ‘fairness in knowing’ and reduce ‘epistemic injustice’ in an ongoing project. The vehicle for this discussion is astrobiology, an emerging scientific field that encompasses 1) questions of whether life can exist beyond the Earth; 2) space governance and planetary protection; 3) inclusive innovation for international development; 4) commercially-viable microbiological solutions; and 5) educational innovation in developing nations. We will conclude by arguing that engaged research can transform research and innovation, moving science communicators beyond perennial arguments about theory vs. practice.

Sarah Davies
The Open University, UK, United Kingdom

Ann Grand
The Open University, UK, United Kingdom

Vic Pearson
The Open University, UK, United Kingdom

Hannah Cooper
The Open University, UK, United Kingdom

Karen Olsson-Francis
The Open University, UK, United Kingdom

1002 Insight talk

Science Communication for Just Transition - Strategies and Challenges of Petrochemical Fenceline Communities in Kaohsiung, Taiwan

Wen-Ling Hong
National Kaohsiung University of Science and Technology , Taiwan

Kaohsiung houses the most significant share of the petrochemical industry in Taiwan. We study three petrochemical fenceline communities through the lens of science communication. The Houjing refinery was closed after a long intensive protest; the Dashe site is undergoing downgrading review; the Dalinpu site is expanding. These fenceline communities are older, with a population around 10,000-20000. Social and economic status are around the national median. To consider just transition and promote anticipatory governance, identifying pollutions and raising awareness is always essential but controversial and complicated. Houjing community used the compensation from the petrochemical company to recruit scientists to identify air and groundwater pollution using FTIR and GC-MS. The locals familiarized themselves with the science of pollution and used it to demand improvement. For more than 20 years, their continuous efforts resulted in the first successful community-led decommission of a large petrochemical site. In Dashe, no resource is allocated for systematic study, and little scientific data are available. Community engagement of the environmental issues is weak. In Dalinpu, which is surrounded by many plants, identifying the source of pollution is nearly impossible. Furthermore, a recent epidemiological study found high arsenic levels in residents' blood, but the cause remains a mystery. An ongoing plan is to relocate the Dalinpu community because of unacceptable health risks and environmental carrying capacity. Social structures play essential roles in the public understanding of science. In Houjing, religious networks and local leaders' narratives greatly influence interpreting and communicating the science data in the community. The petrochemical industry's just transition is a pressing issue, but the resource is much needed to facilitate residents' awareness and anticipatory governance.

Jr-Ping Wang
National Kaohsiung University of Science and Technology, Taiwan

704 Insight talk

Collaboration vs competition: improving public engagement with research through the ScotPEN Wellcome Engagement Award

Becky Hothersall
University of Glasgow, United Kingdom

Since the Beacons for Public Engagement initiative began over a decade ago, academic funders have encouraged researchers to participate in science communication. Researchers are generally supportive but continue to report barriers including lack of support, skills development and access to funding.

Scotland is unique in having a very collaborative and diverse network of science communication professionals working together through the informal ScotPEN network. We have organised conferences and CPD events, applied for joint funding and co-ordinated pan-Scotland public events. In 2019, this collaborative approach led to an award of £500k from the Wellcome Trust to pilot a devolved 1-year funding scheme for public engagement with Wellcome-funded research. Funding up to £100k per project, ScotPEN anticipated that by collaborating rather than competing we can increase the quality and quantity of eligible engagement projects. A second phase is now running in 2020-21.

The pilot scheme devolved decision-making while capitalising on expertise within the ScotPEN network – for example in brokering relationships with appropriate partners and audiences. This allows us to ensure proposals are relevant and sensitive to local contexts, and thus to the place-based, civic engagement agenda that increasingly drives science communication.

Our funding criteria emphasise capacity building and diversity in science communication. This includes support with proposal development and enhanced recognition for early career researchers through co-applicant status.

The network structure also creates opportunities to share training and learning, and facilitates inter-institutional collaborations.

We believe this approach will lead to impactful projects, in turn increasing visibility and recognition of science communication projects and professionals within academic institutions. This embedding process will ultimately strengthen our ability to form lasting and equitable relationships between academic and non-academic audiences.

We will present insights from the process of developing a collaboratively-run funding scheme, reporting initial effects on uptake from three funding calls, highlighting funded projects and sharing lessons learnt.

Barbara Gorgoni
University of Aberdeen, United Kingdom

Erin Hardee
University of Dundee, United Kingdom

Mhairi Stewart
University of St Andrews, United Kingdom

Heather Rea
University of Edinburgh, United Kingdom

Alison Caldecott
University of Glasgow, United Kingdom

736 Individual paper

U.S. scientists views of gene editing: Measuring short-term impact of the documentary film, Human Nature

Emily Howell
University of Wisconsin-Madison, United States

Advances in human gene editing (HGE) through CRISPR Cas-9 raise concerns necessitating broad discourse across stakeholders on what are appropriate paths forward. Research on different forms of communication on HGE is still sparse, however, and none, to our knowledge, examines views in scientific and expert communities, or the effects of such communication through film.

Here, we present results of an experiment testing the impact of a documentary on scientists' views of HGE. We worked with the filmmakers behind a new documentary on CRISPR, called Human Nature, to assess the film's impact on scientists' views of HGE. We collected data at pre-release screenings for research communities at Harvard and UC-Berkeley – birthplaces of CRISPR. All respondents took a survey before and after the film: half receiving risk/benefit questions pre-screening and items on views of the film post-screening, and half receiving items on views of documentaries pre-screening and risk/benefit questions post-screening. Within the risk/benefit questions, we also had A/B formats in which respondents were randomly assigned items on either how risky/beneficial human gene editing is or how risky/beneficial it could be.

Results indicate the film made scientists more ambivalent: seeing more risk and more benefit. These increases in risk and benefit perceptions were predominately among those who responded to items on how risky/beneficial gene editing could be. Increased risk perception was also more likely in views of risk to society, compared to risk for individuals, but benefit perceptions increased more in perceived benefit to individuals. The scientist audiences were also significantly more likely to indicate that the public would see higher levels of risk than benefit, even though they themselves were more likely to see benefit than risk. We will discuss these and additional studies planned for non-scientists audiences to understand the impact of documentaries for communicating complex issues in science and society.

Claire Holesovsky
University of Wisconsin-Madison, United States

Shiyu Yang
University of Wisconsin-Madison, United States

Dietram Scheufele
University of Wisconsin-Madison,

Preaching to the choir? Science communication and the audiences not reached

Christian Humm
Karlsruhe Institute of Technology, Germany

Various parts of society are not reached by the established forms of science communication. This challenge for equitable participation is increasingly addressed in research and practice (e.g. Bultitude 2014, Dawson 2019). However, a comprehensive overview of underserved audiences is lacking so far. The heterogeneity of the underserved audiences makes it difficult to define concrete groups. Often, it is a combination of different factors and practices of science communication that lead to marginalization. Therefore, we took the approach of identifying exclusion factors based on a systematic review of research and practice literature, resulting in a comprehensive typology. This typology includes 31 exclusion factors — categorized into three layers: individual, social and systemic factors (Schrögel et al. 2018).

In this talk, we are going to introduce the typology and present qualitative and quantitative data to corroborate it. The quantitative data are based on an analysis of the representative survey on societal attitudes and opinions on science “Wissenschaftsbarometer” in Germany. The qualitative data stem from interviews with three underrepresented audiences, which have been chosen as exemplary case studies: Muslim youths with a migration background, socially disadvantaged people in marginalized neighbourhoods and students in a vocational school. Both types of data show the impact of the factors and make the exclusion effects visible.

The typology allows science communication practitioners to address exclusion mechanisms and might be a useful framework for researchers investigating inclusion and diversity in science communication.

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Philipp Schrögel
Karlsruhe Institute of Technology, Germany

Annette Leßmöllmann
Karlsruhe Institute of Technology, Germany

732 Demonstration

Science Communication & Television: Emerging opportunites for widening participation in research to realise research for all

Jill Hurst
University of Kent, United Kingdom

A declining printed press together with the popularity of social media, vlogging and You Tube has resulted in a rapid change in the way the public consumes science information. Within this changing landscape, however, television continues to be one of the most trusted mediums for science communication. Moreover, the desire for interesting and quality science content communicated directly by scientists themselves is growing. According to OFCOM, (the UK's public service television broadcast regulator) mainstream television offers a limited range of scientific factual programmes particularly those that are research led. This gap, together with an evolving local UK television market, presents an opportunity for scholars to co-produce quality scientific televisual content. Doing so creates the potential to engage a mass audience with the research, while retaining the integrity of the underlying work.

This interactive workshop will demonstrate how University of Kent scientists, outreach and research professionals have teamed up with a regional television station to produce a series of cutting-edge, science documentaries.

While a body of literature exists on the impact of television content in the fields of public health and consumer marketing very little empirical work has investigated if, by using a pathway of public engagement, audience participation can be determined beyond raw viewing figures. Current commentary suggests the contrary. Nevertheless, the BBC's Blue Planet, 'plastic bag' campaign' indicates this is not the entire story.

In this session we will talk you through the planning and production stages of academic filmmaking. We will explore a range of public engagement and widening participation activities that have been used to create a dialogue with our audiences together with the challenges we have faced in building scientifically robust designs and evaluation methods.

Betty Woessner
University of Kent, United Kingdom

Andy Richards
KMTV, United Kingdom

Darren Griffin
University of Kent, United Kingdom

1024 Individual paper

Science, YES we can!

Marima Hvass-Faivre d'Arcier
1, 2, 3, sciences (association), France

We started 1, 2, 3, sciences to help children and adults build the confidence to ‘do’ Science, based on the idea that knowledge sticks better when it is personally experienced, discovered, owned, placing sciences in its natural place, i.e. in people’s everyday life. The Covid pandemic is a perfect example of the need to understand Science.

Children over 5 yrs and adults of all ages and backgrounds are invited to some serious science play, exploring, trying, discussing. We also welcome scientists, as long as they neither “teach” nor “explain” to the rest of the group.

Everyone collaborates towards a common conclusion. We call this CLP for ‘Conclusion Locale Provisoire’(Provisional Group Conclusion), however small it might be. This collective work-in-progress is expressed in plain language, without ready-made scientific notions.

This experimental approach, based on observations and everyday life objects, is therefore limited to the macroscopic world as this is the very scale compatible with our human senses. With this limit, the active participation validates the scientific legitimacy of the group’s CLP.

Touring Africa (Morocco, Togo, Benin), we encountered the same prejudice towards science as observed in Europe: when it is simple and accessible, it cannot be real science! Interestingly, after a while, participants declared: “I feel my science instinct waking up”.

Throughout the last 20 years, and repetitive surveys, we found a real enthusiasm for our methodology, a change in the way our participants would look at the world, enhanced curiosity and self-esteem, and an increased attention to scientific issues. Experiencing for themselves the scientific process, they feel more confident to apply it to their personal and professional lives. Making sense of science brings pleasure and a feeling of shared autonomy.

Now, we are searching for partners to perpetuate the legacy of our experience! All info, including our books: https://123-sciences.asso.fr/

Michel Claessens
European Commission, Belgium

Anne-Marie Cauquil
1, 2, 3, sciences (association), France

Gérard Laporte
University of Nice and 1, 2, 3, sciences (association), France

Odile Viratelle
Bordeaux University and 1, 2, 3, sciences (association), France

712 Individual paper

Masculine public image of science in Japan: what keywords do public associate?

Yuko Ikkatai
The University of Tokyo, Japan

Many studies have examined the public image of science. When asked to draw a picture of a scientist, many people depicted a male scientist in a lab coat. Although the numbers vary by field, in comparison to men, a substantially lower percentage of women study STEM (science, technology, engineering, and mathematics) fields in Japan. At the undergraduate level, the percentage of female students is relatively high in biology at around 40%, but is lower than 20% in physics and mathematics and lower than 10% in mechanical engineering. Although science is perceived to be masculine, the attribution of varying levels of masculinity to science fields in Japan has not been examined. Additionally, Japan ranks low (at the 121st position among 153 countries) on the global gender equality index, as per the Global Gender Gap Index 2020. The authors of this paper hypothesize that Japanese people who have low level of gender equal attitudes are likely to have stronger masculine image for the science fields.

This study conducted an online survey to investigate the extent of masculinity accorded by the Japanese people to six science fields: mechanical engineering, physics, mathematics, information science, chemistry, and biology. The questionnaire items focused on individual gender equal attitude toward gender roles and the gender of the respondents. Additionally, public associations were investigated by asking participants to assign keywords for each of the six science fields. The analysis revealed that the Japanese perceived all six science fields as masculine. For example, the keywords “Galileo” and “Einstein” were linked to physics and “oily and greasy” and “welding” were correlated with mechanical engineering. The individual gender and/or gender-related attitudes of respondents also influenced the masculine image accorded to the fields of study.

Azusa Minamizaki
Nagoya University, Japan

Kei Kano
Shiga University, Japan

Atsushi Inoue
Nippon Institute for Research Advancement, Japan

Euan McKay
The University of Tokyo, Japan

Hiromi Yokoyama
The University of Tokyo, Japan

1058 Insight talk

Applying the Structure of Magic to Science Communication

Jose Ilic
University of Concepción, Chile

There is little research on the effectiveness of the structure of a science communication talk, yet the storytelling structure is widely recommended and regarded as the best way to organize a science talk. This aforementioned structures are usually based on Campbell’s book The hero with a thousand faces which outlines the basic structure of a story. As part of our research we have investigated a different structure on which to base a science communication talk, in particular we have approached the problem from another area of performing arts: magic and illusion. We have studied the works of several magicians that are considered to be, by their community, the most important and essential in magic. From there we compiled a structure for a science communication talk based on the structure of magic, where the primary focus is to maintain and manage the audience’s attention, rather than what the story structure proposes. There are two main reasons on why we think magic is a better approach than storytelling. First, magic is actively trying to elude the suspension of disbelief, which is exactly what a science communication talk needs; and second, the entire field of magic is dedicated to the manipulation of attention and expectations and we expect that to be translated on the structure. We developed an Agent Based Model to test this structure in comparison to three story structures and we expect to publish our results in the Journal of Public Understanding of Science by the time of the PCST Conference. For this conference we will explain the proposed structure, compare it to the storytelling structure and reveal what the experimental data has produced.

José Ilic
Universidad de Concepción, Fundation 42,

1019 Demonstration

Five studies, five ways: Transforming youth engagement through co-created infographics, factsheets, comics, videos and songs

Robert Inglis
The Yazi Centre for Science and Society in Africa, South Africa

Fostering dialogue between researchers and researched communities can be challenging. Inherent power dynamics and differing world-views may result in poor communication and a lack of genuine engagement. This demonstration outlines the strategy, implementation and evaluation of a participatory multi-media youth engagement programme. It is presented in hope of sharing lessons learned, challenges and recommendations.

In 2019 the Africa Health Research Institute (AHRI) partnered with science communication agency Jive Media Africa to deepen understanding of scientific research among young people. Participatory, co-creation approaches were used to enhance dialogue, empower participants and gather insights which c inform future research relevant to the communities where it is conducted.

Five adolescent health research studies undertaken at AHRI (which hosts a large health and demographic surveillance and intervention programme in rural South Africa) formed the basis for the programme. These included; a tuberculosis prevalence survey, piloting home-based testing for sexually transmitted infections, assessing healthcare services, understanding health risks associated with migration and gaining insight into concepts of hope and resilience among young people.

Scientists, staff, ‘peer navigators’, public engagement personnel and 30 school pupils workshopped, co-produced and tested:
Fact sheets (1), incorporating infographics (2) and comic strips (3)
Short films (4) on themes identified in the studies, starring scientists and youth
Five original songs (5), created, recorded and performed in response to each of the 5 studies. (The Hip Hop Health methodology has been previously presented at PCST). The songs were used to develop short radio packages incorporating researcher interviews for broadcast on community radio stations in isiZulu and English and are also being incorporated into a theatre production.

Focus group discussions with participants provided insight into both products and process. The work is highly replicable in both high- and low-income settings and we look forward to engaging with others to share approaches and insights from participatory co-production processes.

Hannah Keal
Africa Health Research Institute, South Africa

Nomathamsanqa Majozi
Africa Health Research Institute, South Africa

1077 Visual presentation

Magic with Maths: Closing the distance between students and Mathematics

Luis Islas Cruz
Centro de Investigación en Matemáticas, Mexico

The understanding of elemental subjects in Mathematics is quite difficult for many of the Mexican students of primary and secondary school level. The low interest of children and teenagers is one of the biggest issues on this matter. Therefore, playful and educative activities have become necessary to create a tight bond between elemental Mathematics, students, general population, and Mathematical culture.

The Centro de Investigación en Matemáticas, a public research institute in Guanajuato, Mexico, through its science communication group, Matemorfosis, has created several activities that not only address meaningful Math topics, but also try to compel the students to have fun and even more, understand that those topics are closer to their lives than they thought.

This Visual Presentation pretends to show one of the resources created to achieve this approach to the students. Some workshops around magic tricks that work using Mathematics have been developed and improved, in order to introduce enjoyable applications of Mathematics to students.

We will be presenting three magic tricks as an introduction to this resource. One trick is a version of an exercise shown by David Copperfield on National Television. Our version has a plot to catch the attention of children and teenagers. The explanation uses simple Arithmetic and introduces a very interesting area of Mathematics called Mathematical Invariance where no matter the initial data, the process makes the result remain the same.

Two other tricks will use poker cards. The student, playing as spectator, selects cards and the magician performs theatrical illusions that amuse and amaze. These tricks can be revealed using Algebra, Combinatorics and Mathematical Invariance once again.

Everything shown is easy to replicate using affordable and reachable materials. The reveals of the tricks will be shown as in a workshop. The audience will be able to participate and will get hints to discover how the tricks work.

Marco Figueroa
Centro de Investigación en Matemáticas, Mexico

Rocío González
Centro de Investigación en Matemáticas, Mexico

680 Individual paper

Co-creation with stakeholders in the development of nanotechnologies

Sikke Jansma
University of Twente, Netherlands, Netherlands

Within literature co-creation has been referred to as socially robust knowledge production (Gudowsky & Sotoudeh, 2017), product creation and development (Voorberg et al., 2015), and as the highest form of public engagement (Arnstein, 1969). Although co-creation increasingly gained attention within the domain of science and technology studies and science communication, little is known about how to effectively design co-creation processes.

The current research is a comparison of three co-creation sessions in the Netherlands on the development of nanotechnologies in health. Various types of stakeholders were present, including researchers, citizens, policymakers, CSOs, and business experts. Each co-creation sessions lasted 4,5 hours and was based on design thinking methodology (e.g., Yoo et al., 2013). The aim and thematic area differed per session, including: nanotechnologies for diabetes (product suggestions), sensor technologies for health (research lines), and policymaking for nanotechnology in health (policy recommendations). Every session was recorded, and after every session participants filled out a questionnaire. Based on the recordings and the questionnaires, the indicators ‘mutual trust and understanding’, ‘co-creation process’, and ‘outcomes’ were analyzed, and criteria for setting up an effective co-creation process were detracted.

It proved essential to explore stakeholders’ needs during the preparation for having an in-depth discussion and come to specific outcomes. The more open the co-creation process was, the more difficult it was to detect a sense of ownership. Furthermore, there is a trade-off between inclusiveness and specific discussions; the latter leads to more relevant output, but for a smaller group of stakeholders. Some stakeholder emphasized the importance of including (potential) users rather than citizens in this regard. In order to come to added value for product and research development, one co-creation session was not sufficient, but a continuous dialogue is needed.

The study was conducted as part of the EU funded GoNano project (Grant Agreement n° 768622)

Anne M. Dijkstra
University of Twente, Netherlands

709 Individual paper

Marketing as a useful tool in public communication of science and technology

Andrzej Jasinski
University of Warsaw, Poland

Introduction. In the world's literature, one can find quite many considerations referring to marketing of technology or technological innovation. Unfortunately, the publications considering science marketing or marketing of R&D appear much more rarely – e.g., Baaken (2009), Bialon (2010), Frischmann (2005), Isabelle (2007), Jasinski (2015), Markman (2005), Shankar (2008).

Participating in numerous PCST conferences since 1998 (except last three), the author has realized that some issues were practically absent during those conferences. A list of the omissions is as follows: (1) the main subject of the conference considerations is science communication, however, if we deal with PCST we should speak rather on communication of science and technology, (2) an idea to use marketing-mix as one of possible approaches to science communication is in principle non-existent, (3) also, among various depictions of science communication, marketing communication (previously named as promotion) of science is hardly seen, (4) some aspects of science marketing are practically absent, e.g., Science-to-Business Marketing.

The main aim of this paper is to show how marketing communication can be used by PROs to communicate with society - especially if a given science product is devoted to the business sector - with a purpose to facilitate University-Business Cooperation.

Theses. What is characteristic of marketing communication is that a marketing thinking is a kind of reverse thinking: it begins 'from the end', i.e., from potential receivers of a message. So, to be successful, the communication process also starts with an identification of target groups of final addressees of the message and goals of the communication campaign. In turn, such identification requires a segmentation of potential receivers.

Methodology: literature studies, a case-study of a research institute in Poland, and questionnaire research among enterprises in Warsaw and within University of Warsaw.

Andrzej Jasinski
Faculty of Management, University of Warsaw ,

626 Insight talk

Researching the role of science communication in socially responsible research around the world

Eric Jensen
University of Warwick, UK, United Kingdom

This paper presents a global study of how socially responsible research policy and practices, with a particular focus on the role of public engagement with science. The mixed methods research integrates both an online survey (n = 2000+) and qualitative interview (n=120+) data collection in 20+ countries. This study was conducted across all world regions, with the survey available in 15 languages. Open ended data were content analysed. This European Commission-funded project RRING (rring.eu) aims to establish a global network for socially responsible research and align socially responsible research practice with the Sustainable Development Goals (SDGs) as a global common denominator. Here, we focus on the aspects of this large project that are most relevant to science communication.

The project acknowledges that each region of the world is advancing its own agenda on making its work socially responsible. It advances beyond the state of the art of research on socially responsible research policy and practice by opening up the definition of ‘responsible research and innovation’ to be defined by global participants, and by aiming for a globally shared language about socially responsible research in a way that has not been achieved in prior scholarship. This presentation focuses on the practice-level research, with thousands of researchers and research support staff to understand best practices globally, including both in-depth structured qualitative interviews and survey research. The findings highlight the different role of public engagement with science and science communication practices in different parts of the world, as well as the diversity of practices that are employed. Moreover, the research shows how policies designed to encourage public engagement are taken up or not by researchers at the level of practice, and the factors underpinning such (non-)adoption of public engagement.

Alexander Gerber
Inscico, Germany

Lars Lorenz
International Consortium of Research Staff Associations, Germany

758 Individual paper

Examining Chinese scientists' media behaviours: institutional support and media experience predict involvement

Hepeng Jia
Department of Communication, Cornell University, China

Mobilizing scientists to engage the public has long been both a significant task of science communication practice and a research target. Despite studies revealing worldwide reality, trend, and pattern in the field, few studies have been done to examine how Chinese scientists have been engaged in the process, although the country has become a scientific powerhouse. The current research is such an effort.

Through an online survey responded by more than 500 Chinese scientists, we found that only a small portion of Chinese scientists regularly had media contacts. The descriptive analysis found that Chinese scientists have a very infrequent media interaction and low evaluation of media reporting quality. They also perceived the minimal role of the media in their professional development. The findings were supplemented by regression analysis that suggested Chinese scientists’ low media involvement was primarily a result of the lack of institutional supports, their unfamiliarity with the media, and their perceived institutional censorship.

While highlighting the organizational and cultural preferences of the Chinese scientists in communicating science, our results also have substantial policy implications. It is not only necessary to work out more policy incentives to promote science communication, but also urgent to launch various interaction initiatives to narrow the gap between science and the media. Research institutions’ publicity function must be enhanced, and intermediary organizations between science and the media should be developed to help scientists better engage the public through the media.

Dapeng Wang
China Research Institute for Science Popularization, China

Lin Shi
School of Arts & Communication, Beijing Normal University, China

Yihong Tan
National Science Library, Chinese Academy of Sciences,

782 Individual paper

Why as nuclear power experienced lower public resistance in China? - Examining anti-nuclear activism and knowledge-control regime

Hepeng Jia
Department of Communication, Cornell University, China

Scientific controversies have been a main issue in science communication scholarship. Different controversies have shown divergent patterns. Yet scholars have failed to examine multiple factors that lead to the various modes.

In China, as compared with the West in the 1970s and 1980s, and with other controversial technologies such as genetically modified organisms (GMOs), controversies surrounding nuclear power have been extremely low-profiled. To understand the different pattern, we adopted the framework of the knowledge-control regime to examine the media landscape of nuclear power in China, then investigate media's knowledge production regarding the energy, and finally explore the control and monopoly on knowledge production within the atomic power sector and in the sector's public outreach activities.

Chinese media have been generous in framing nuclear power development as the symbols of national honor, S&T progress, and independent innovation even after the Fukushima accident. Chinese journalists structurally avoided news topics questioning nuclear power for higher perceived risk and less recognized rewarding. A stable media- nuclear power relationship also contributed to the knowledge-control regime in Chinese more favorable to the nuclear power sector.

For the internal knowledge production process, the monopoly in knowledge production caused by nuclear science's natural characteristics is coupled with the power concentration as reflected by the number of top academics owned by the sector and their dominance in public agenda. With the nuclear power sector's glorious historical images, as well as its active science communication, effective uncertainty management, and friendly interaction with the media, the internal knowledge control is effectively "exported" to help maintain a generally higher public acceptance. Hence, we identify the knowledge-control regime(s) surrounding the nuclear power sector and concludes it has effectively curbed anti-nuclear activism in China. Implications are also discussed.

Lifeng Deng
School of Communication & Design, Sun Yat-sen University, China

1158 Roundtable discussion

Voice of China in Science Communication: Pandemic and beyond

Hepeng Jia
Cornell University, United States

With rapid development of Chinese science, science communication in China has also enjoyed a tremendous progress, though in a pathway quite different from the West. In the past years, a group of empirical studies have revealed the high-organized, technology-driven, sometimes hierarchical, yet highly efficient landscape for Chinese science communication. Unfortunately, most of the studies have not been published internationally. Therefore, dialogues between Chinese scholars and their international counterparts are highly necessary not just for better understanding each other but for a deep exploration of alternative factors shaping science communication behaviors and consequences. The final goal, then, is to explore the utmost solution to spread the benefit of science among the maximum populations.

The roundtable is designed to have a group of panel speakers presenting their (or their partners') studies demonstrating the unique characteristics of science communication in China, and then to invite science communication authorities based in the US or Europe as discussants to initiate discussion and debates. Audience's participation is expected to lead to more meaningful dialogues. The panel speakers will report findings on the highly organized science communication in China, which resulted in a wide mobilization of Chinese scientists but the failure of individual attitude to predict the intention to engage the public among these scientists. For health behaviors, it was found that nationalism is the most powerful predictor of Chinese public's intention to take preventive measures against COVID-19 pandemic.

Besides the roundtable speakers listed below, the panel also proposes Bruce Lewenstein, Professor of science communication, Cornell University (to be confirmed) and Cong Cao, Professor of science policy, University of Nottingham, Ningbo, China as discussants.

Dapeng Wang
China Research Institute for Science Popularization, China

Hang Lu
Department of Communication and Media, University of Michigan, United States

Yajie Chu
School of Journalism, Fudan University, China

Xi Luo
School of Communication, Soochow University, China

558 Individual paper

Nature goes Behind the Paper - how community blogs for researchers can be used to share their personal stories

Benjamin Johnson
Springer Nature, United Kingdom

Back in 2015, having learned much from early community experiments such as Nature Network, Springer Nature decided to build a series of community blogs. The goal was to strengthen relationships with researchers, provide an additional author service, raise the visibility of our authors and editors, and support new journals such as Nature Microbiology, Nature Astronomy, and Nature Catalysis.

https://communities.nature.com/

Four years on, we publish around 200 blog posts each month on 9 subject-based communities, from Astronomy to Sustainability, with unedited content from editors, authors, and other regular contributors. Nature Research editors write about their personal lives, tips for researchers wanting to submit to the journals, and conference reports. Authors tell the personal story behind their research in our popular Behind the Paper series; we published more than 1000 author posts in 2018 and have shared more than 200 original images and videos from researchers via our Instagram account @nature.research. We also have a small group of regular contributors, who use our platform as their personal blog, benefiting from the visibility of nature.com.

This is an opportunity for us to share what makes a successful online community and show the power of unedited storytelling. Using examples from the communities, we will show how the size of the community affects engagement, how to commission content from busy academic researchers, how to implement a social media strategy, how to persuade internal stakeholders that community engagement is worthwhile, and how to measure the success of these activities, while providing a service for academic researchers and educating the general public.

781 Insight talk

How to bring Immunology to schools - a best practice report for a school lab

Elisabeth Jurack
University of Bonn, Germany

Presently in Germany immunology education in schools rarely involves any hands-on or first-hand experiences. Rising numbers of non-vaccinated children and adults are presenting a high risk of once eradicated infectious diseases coming back. To teach young students about the immune system and how lab-work is being done in an immunological environment, we established from scratch a school lab called ‚ImmunoLogisch'. This development was part of the MultiCO project funded by the European Commission. It includes partners working together from five countries: UK, Finland, Estonia, Germany and Cyprus. The main aim is to promote the students' interest in science, their engagement in science learning and their awareness of science careers. The school lab is located in a lab building at the campus of the University Hospital Bonn. It consists of two parts: first lab work by conducting an experiment dealing with measles and second a part where the students learn about the day of a technician in the lab with a video in selfie-style and a tour in the biggest lab on campus with over 40 technicians working in it. The students are drawn to the topic in the beginning by starting with building a scenario of a measles outbreak in which they should provide help. The school lab finishes with a discussion about vaccination. Next to the topic of immunology, students are as well being educated about scientific methods and good scientific practice in the lab.

Annette Scheersoi
Technical Methodology Biology, University of Bonn, Germany

843 Insight talk

Co-Design as a Paradigm Shift in Science Communication related to complex problems

Eva Kalmar
Science Education & Communication, TU Delft, Netherlands

Science Communication has shifted from decreasing knowledge deficit to engage and initiate discussions with the public about, for example, vaccination denial or fear from GMOs. These problems are complex, and current public engagement practices are tackling them only from a single perspective, leaving complexity and some stakeholders out of the picture. Co-design is frequently used to solve complex problems and to engage different stakeholders actively, but not in Science Communication. Co-design is a process in which users and other stakeholders are involved in some phases of design to create a product, service or experience together.

SEED, a 2-day-long co-creation think tank was organised around the topic of Blockchain for Science. The aim of SEED was to create multidisciplinary teams out of stakeholders to solve critical issues of the scientific life cycle. Librarians, Blockchain developers, researchers from natural and social sciences were sitting together with lawyers, grant officers and patent officers to formulate concrete problems and to come up with Blockchain-based solutions. Six teams were working on the issues, and at the end of the sessions, they have voted for the best project which was developed to a minimal viable product.

Qualitative analysis of team processes during the think tank show that co-design helped the freshly formed multistakeholder teams in initiating effective discussions in most cases. Analyzing the interrelations of the stakeholders and understanding other stakeholders' perspectives helped the deeper understanding of the problems. Those teams, which discussed fundamental issues standing behind the problems more were able to come up with game-changing and creative solutions, compared to those in which participants had a fixed mindset.

Based on our experiences, we argue that co-design has the potential to initiate effective discussions between different stakeholders of science communication-related complex problems, leading to a deeper understanding of the problems and to more successful solutions.

620 Insight talk

RAS200 - astronomy and geophysics reach out to new communities

Sheila Kanani
Royal Astronomical Society, United Kingdom

2020 sees the Royal Astronomical Society – the oldest learned society covering astronomy and geophysics in the world – celebrate its 200th anniversary. In the run up to 2020, the RAS initiated an outreach and engagement scheme aimed at bringing the society's sciences to new audiences, those who might not normally attend public lectures, planetarium shows or even star-gazing evenings. Committing £1 million to the project, the RAS deliberately sought out new partners who would take it out of its comfort zone with a bottom-up funding scheme making up to £100k available for five-year projects. Competition for the funding was fierce with just 12 projects funded out of more than 150 applications.

Starting in 2015, the Prince's Trust has used astronomy to inspire young people who have had some of the hardest starts in life. Carers who hardly ever get a break from their duties are funded to spend weekends learning about the stars on the Scottish island of Coll. A new planetarium show using Holst's classic "Planet Suite" and modern adaptations brings the heavens in Full-dome 360 animation to audiences via mobile planetaria. New courses for adults who missed out on their education first time round have been developed. And Welsh cultural festivals now resonate to poetry, dance and music inspired by astronomy.

Starting two years later, geophysics is being used to engage football crowds with science, and prisoners are being helped maintain links with their families through astronomy. In Cornwall, Galway and South Africa, artworks, trails and exhibitions are taking astronomy out to local people. And young girls and women in the Girl Guides have new badges to work for. All of these projects, too, are being adapted to suit people on the autistic spectrum. All projects and the scheme as a whole are being evaluated by external consultants, and the evaluation work carried out so far will be discussed in the conclusion of this talk.

Steve Miller
UCL, United Kingdom

Sue Bowler
Royal Astronomical Society, United Kingdom

Liz Jeavans
Jenesys Associates Ltd, United Kingdom

1159 Individual paper

'Visible' but not yet 'Celebrities': The case of Indian Scientists during COVID19

Siddharth Kankaria
National Centre for Biological Sciences, Bangalore, India

The advent of a global pandemic like COVID19 has pushed several scientists to rise to the challenge of communicating health, risk and scientific information about COVID19.

But unlike Antony Fauci in the US or Salim Abdool Karim in South Africa, no Indian scientist has quite acquired the status of a star scientist, or become synonymous with being the sole public authority on COVID19.

Instead, there seems to be a wide array of Indian scientists that have become highly ‘visible’1 but not quite acquired ‘celebrity’2 status. Many of them have become active within public collectives of scientists and scientific organisations that surfaced in 2020 to jointly engage in public communication of COVID19-related information.

My talk will examine a few case studies of such ‘visible’ but not yet ‘celebrity’ Indian scientists, and describe relevant features of their communication strategies during this global pandemic.

In the true spirit of Indian plurality, my talk also will discuss the implications of having such a wide diversity of ‘visible’ expertise for not only communicating COVID19-related information but also for fighting misinformation, ensuring public trust in science and engaging stakeholders in discussions about the process of science.

1 - Goodell, R., The Visible Scientists, Boston, MA: Little, Brown, 1977
2 - Fahy, D. & Lewenstein, B., Scientists in Popular Culture, Handbook of Public Communication of Science and Technology: 83-96, 2014

912 Insight talk

We believe it, but we don't care: what's wrong in science communication on climate change in Taiwan?

Pei-Chin Kao
Risk Society and Policy Research Center, National Taiwan University, Taiwan

Hollywood disaster movies attract the public’s attention on climate change, as well as the statistical change in the climate system has forced international governments to take necessary actions. However, a study published in Nature Climate Change in 2015 revealed that 40% of adults worldwide have never heard of climate change; in March 2016, Pew Research Center released the results of a public opinion poll, showing that only 38% of Americans conceive climate change as a considerable problem worth solving. While in Taiwan, the voices of climate change skeptics are not often heard. In Survey on Taiwanese People’s Attitudes towards Climate Change and Energy 2018 from Taiwan Institute for Sustainable Energy, 92.7% of people believed that climate change is happening; 58% of them agreed that climate change is greatly affecting Taiwan, and 18.6% of them believed that climate change will significantly impact Taiwan in a decade.

From another angle, the number of local news reports on climate change, an important role in risk and science communication in media, was lower than the number from the international news. Meihua Lee’s research (2017) showed that the ratio between the two sources is 1:3 in mainstream newspapers in Taiwan from 2009 to 2016. Moreover, reports on this issue were mostly about politics and livelihood, in which science was absent.

That’s the reason Science Media Center Taiwan chose climate change as our practicing case to enhance science communication between experts and media. In this article, we will describe and analyse our two practices - cooperation with the weekly magazine and experts to produce a cover story and organizing a press background briefing, which is a new approach in Taiwan - to clarify the challenges of science communication in Taiwan. Furthermore, we will identify the problems of journalists and experts in media by interview.

Sinead Hsi-Yi Chen
Risk Society and Policy Research Center, National Taiwan University, Taiwan

Kuei-Tien Chou
Risk Society and Policy Research Center, National Taiwan University, Taiwan

1090 Individual paper

Science with symphony

Milla Karvonen
Allegra Lab Helsinki; University of Oulu, Finland

Classical music seems to be somewhat a neglected media in science communication. However, many classical composers extend their sources of inspiration to science and scientists. There are numerous examples of works from operas of scientists' lives to compositions based on actual scientific data.

Is classical music a good format for informing audiences on scientific topics, or making them interested in science? Does scientific accuracy, emotional connection, or a new point of view matter in the end?

In this mixed methods study, I seek views from composers, musicians, musicologists and science communicators working at the intersection of science and music as well as literature: why compose about science, how can music be used to communicate science, enhance dialogue or even make a change? E.g. climate change is currently worrying artists as well as scientist. Is music being used as a method more by cultural organizations taking a stand, or by scientific organizations trying new methods for science communication, and has there been a change over time?

The paper also explores what kind of contexts these works are presented in, as well as what other methods of science communication are being used together with music.

681 Insight talk

Space researchers as comic heroes

Ulrike Kastrup
focusTerra, ETH Zurich, Switzerland

At focusTerra, the Earth Science Research and Information Centre of ETH Zurich, we focus on promoting the understanding, discovery and enjoyment of Earth and Planetary Sciences within a societal context. We share our knowledge of the history, dynamics and treasures of the planets through exhibitions and a multitude of events that reflect state of the art research. Our solar system exhibition showcased solar system research at the Departments of Earth Sciences and Astronomy (ETH and University of ZÃ¼rich) using a novel approach of scientific storytelling. We have worked closely with our "local heroes", the scientists, to highlight their research and get to the heart of what each person's "big question" is that makes them tick.

We have succeeded in bringing out the personal in our colleagues" research and we take the audience into their world to see what research is really like. Our presentation format "“ a science comic "“ is a combination of art and science and provides what we hope is a fun journey for lay people and experts alike into the science world of our planetary environment. The comics of the exhibition continue to be available as books in four languages and together with our tailor-made school materials provide a great way of teaching science today.

952 Visual presentation

How gaming technology has transformed society's perception of history and historical theory

Marko Kerr
University of Aberdeen, United Kingdom

In 1972 a new form of technological communication was born via Atari’s Pong, the first commercial ‘computer game’. At the time, it was considered a child’s toy. Today, the computer game is one of the most common and transformative technologies seen on a day-to-day basis. Whether it be on mobile or PC; for fun or learning, it is estimated that 2.2 billion people are ‘gamers’.[1]

The transformative impact and capacity of one specific and very popular genre of computer game, the historical game, has had societal implications which have yet been hardly explored. Much like the technologies of written language and motion pictures had an impact on how people understood their history and interacted with it, so has the rapid expansion of the historical video game, which transforms the very concept of history to suit the restrictions of the medium.

It is a field near-unstudied and often-derided, a fact recognised by some scholars.[2] For outside of what little exists on the topic of how video games might be used in classrooms,[3] scholars have largely ignored the impact this modern medium has had on the societal understanding of history despite games having had a close relationship to the theory of history for many decades.

This presentation aims to explore how exactly historical games have impacted society’s understanding of the theory of history over time, and how it is affected by interactive media as opposed to the more traditional and passive communication media of cinema and radio.

[1] https://gaimin.io/how-many-gamers-are-there/
[2] P. Christesen, D. Machado, ‘Video Games and Classical Antiquity’, The Classical World V104 N1 (2010), pp.107-110.
[3] K. Kee, S. Graham, ’13: Teaching History in an Age of Pervasive Computing: The Case for Games in the High School and Undergraduate Classroom’, pp.270-271, in K. Kee (ed.), Pastplay: Teaching and Learning History with Technology (Michigan, 2014).

1123 Visual presentation

Piloting the use of virtual reality video of research laboratories as a public engagement tool in secondary school students in Kilifi, Coastal Kenya

Patience Kiyuk
Centre for Geographic Medicine Research-Coast, Kenya

Virtual Reality (VR) is poised to profoundly transform the way science is communicated to the general public. Although relatively new, VR has been used in Europe to promote understanding of Science, Technology, Engineering and Maths (STEM) through projects such as Labstar which gives students access to a realist laboratory experience to conduct experiments risk-free. However, there is no documented evidence of using VR either for STEM education or for school engagement in sub-Saharan Africa. We aimed to produce a virtual reality video tour of the KEMRI-Wellcome Trust Research Programme (KWTRP) laboratories and test its suitability as an engagement tool in secondary school students.

A group of 14 students from various secondary schools but residents of Kilifi County were invited for a guided tour of the KWTRP laboratories. Thereafter split into three groups to discuss their understanding of the tour and, importantly, what they found relatable to what they were learning in school. That discussion formed part of the script used to shoot a 360-degree video of the laboratories. The video captures simplistically the overall basic research conducted at the KWTRP, demonstration of various experiments, different researchers working at their stations, and short interviews with scientists.

We report on the participatory process of preparing a VR video, and the step is to show the video at schools to students using the VR headsets. Feedback questionnaires and focus group discussion data will provide insights into student views and acceptability of virtual reality for public engagement. By communicating science through VR, we hope to spread awareness and increase appreciation of research by the public.

Grace Mwango
Centre for Geographic Medicine Research-Coast , Kenya

George Nduva
Centre for Geographic Medicine Research-Coast, Kenya

Solomon Mutuku
Centre for Geographic Medicine Research-Coast, Kenya

Cynthia Mauncho
Centre for Geographic Medicine Research-Coast, Kenya

Noni Mumba
Centre for Geographic Medicine Research-Coast, Kenya

Alun Davies
Oxford University, United Kingdom

Samson Kinyanjui
Oxford University, United Kingdom

677 Insight talk

Inspire, Engage, Involve: Welcome to the New European Science Engagement Platform

Annette Klinkert
European Science Engagement Association, EUSEA, Germany

The fields of science communication and public engagement have become larger and more professional in the past few years. New formats and joint initiatives have been created, guidelines for best practice have been established and the field of science of science communication is growing.

But so far, most of these efforts have developed separately in local, regional or national contexts. Therefore, the European Science Engagement Association, EUSEA, has started to gather, sort and disseminate different formats and concepts for communicating research and engaging people with science across Europe and globally. The platform will be built upon past experiences, reflect present best practice and lead towards future strategies in Public Engagement across Europe.

At the PCST conference, EUSEA will present this new European platform, which wants to inspire and foster knowledge transfer, thereby further connecting the European Science Communication and Public Engagement community. The platform will share best practices and knowledge on upcoming trends and formats, and offer guidelines for engaging successfully with different audiences.

The European Science Engagement Platform and two examples of useful science communication and public engagement formats will be presented by EUSEA President Cissi Askwall and EUSEA Director Annette Klinkert. They will also explain how to add formats and encourage all participants to do so, providing them with a template to be shared within the professional community.

Cissi Askwall
President EUSEA, CEO Vetenskap & Allmänhet, Stockholm, Sweden

841 Demonstration

How to Deal with Growing PETs? Co-Creating Guidelines for European Public Engagement Trainings

Annette Klinkert
European Science Engagement Association, EUSEA, Germany

All over Europe, Public Engagement Trainings, PETs, are emerging. These PETs come in different forms and sizes. They promise multiple benefits and cover a wide range of topics – from communication to stakeholder engagement, from evaluation to funding opportunities, from self-assessment to career development. PETs in Europe are conducted by a large and diverse variety of trainers inside and outside of academia. As Open Science and Public Engagement are gaining relevance in the European funding landscape, PET providers increasingly reach out to researchers, science communicators, universities and academic institutions, promising them to support their needs in meeting the new expectations.

In this session, a group of European Public Engagement practitioners and researchers will a) give an overview of the development of PETs over the last decade; b) present and critically reflect on a selection of currently running PET programs and c) elaborate on future requirements in changing European Research and Innovation landscapes.

Together with the PCST participants, we will strive to develop a set of Practical Guidelines for European PETs. We will do so in a co-creative way: After a 10 min input from each speaker, participants will split up into 3-5 roundtables. At each table, quality criteria for PETs will be developed, which will be shared with the larger PCST Community after the conference. The session will present “do’s and don’ts”, enabling participants to develop their own PETs or find the best ones in their neighbourhood.

Kenneth Skeldon
Wellcome Genome Campus, United Kingdom

Edward Duca
Head of Public Engagement, Malta University, Malta

676 Demonstration

Co-Creating a New European Science Engagement Platform

Annette Klinkert
European Science Engagement Association, EUSEA, Germany

The fields of science communication and public engagement have become larger and more professional in the past few years. New formats and joint initiatives have been created, guidelines for best practice have been established and the field of science of science communication is growing.

But so far, most of these efforts have developed separately in local, regional or national contexts. Therefore, the European Science Engagement Association, EUSEA, has started to gather, sort and disseminate different formats and concepts for communicating research and engaging people with science across Europe and globally. The platform will be built upon past experiences, reflect present best practice and lead towards future strategies in Public Engagement across Europe and beyond.

EUSEA invites PCST participants to peer-review and contribute to this new European Science Engagement Platform. Together we will develop ways to inspire and foster knowledge transfer, thereby further connecting the European Science Communication and Public Engagement community. The platform will share best practices and knowledge on upcoming trends and formats, and offer guidelines for engaging successfully with different audiences.

At PCST, we would like to present this work in progress and invite participants to add their suggestions and successful activities to the platform.

The platform will be introduced by EUSEA Director Annette Klinkert, followed by round table discussions where participants share feedback and possible formats with each other and fill out a template for each of the formats that the table mates find useful. The demonstration will be facilitated by EUSEA President Cissi Askwall, Vetenskap & Allmänhet, Sweden.

Rebecca Winkels
Project Manager Wissenschaft im Dialog, Berlin, Germany

Cissi Askwall
EUSEA President, CEO Vetenskap & Allmänhet, Sweden

Anna Maria Fleetwood
Senior Advisor External Relations Swedish Research Council, Sweden

594 Individual paper

Idea(l)s and gaps of researchers' and in-house communication professionals' science communication collaboration

Kaisu Koivumäki
University of Oulu, Finland

Increasingly researchers regard communication with the publics as their responsibility whilst the academic community takes on engagement with the digital public sphere. But how are the responsibilities of research communication managed within the research organizations? One may even ask if mediators are needed anymore since researchers may govern and transform their public science-society relations through social media connections they have at their fingertips?

However, the perceived responsibility does not necessarily translate to a ‘duty’ that is integral to researchers’ work. Digital media outreach may be an occupational challenge for the researchers whilst organizational distances between communication professionals and researchers sometimes occur.

This paper presents preliminary findings of an analysis of semi-structured interviews of 15 in-house science communication professionals and 17 researchers from five research organizations in Finland. With the aim to enhance the collaboration, that constitutes organizational science communication, this study focused on understanding how are the complexities in researchers’ and professionals’ collaboration.

Results show that interviewees preferred researchers before communication professionals to communicate science. However, researchers clearly state, that professionals are still needed, but their role needs to change. Professionals were regarded as highly relevant in encouraging and couching the researchers’ online communication efforts, whilst uncertainties around the role of the researchers occurred. Therefore surprisingly, many interviewees were willing to exclude reflexive discussions of science-society relations from communication training, saying that these are duties of others, not researchers.

The findings highlight gaps between science communication conceptualizations and organizational realities, that question the academic institutions’ capabilities to contribute with scientific knowledge to societal discussions online. Developments in digital practice, academia and society call for scholarly integration of functional and socio-cultural perspectives of science public relations research. Practical implications enhance understanding of transformations in science communication practices and professions.

Timo Koivumäki
University of Oulu, Finland

666 Insight talk

Exploring the intersections: Researchers and communication professionals' perspectives on the organizational role of science communication

Kaisu Koivumäki
University of Oulu, Finland

In contemporary science communication, a wide range of personal, organizational and social drivers influence communications that are taking place, whilst performance-based funding policies including communication and impact activities, are spreading in Europe. However, there are shortages of academic research as to how different organizational and institutional environments shape the drivers of science communication in specific contexts.

This paper reports on research exploring the intersections between researchers and communication professionals' perspectives on the objectives, funders, and organizational influences on their digital science communication practices. Exploring one context, a large inter-organizational research project in Finland, this paper presents data from semi-structured interviews with 17 researchers and 15 communication professionals.

Researchers and communication professionals identify subtly different sets of normative and deliberative drivers in their science communication practices. Funders appear to be influencing the aims, assumptions and cultures for science communication, at both organizational and individual levels sometimes bypassing the academic structures and organizations. The funders' expectations may be perceived as somewhat artificial regarding grant applications and monitoring. This may decrease the academic community's respect for science communication and lead to overhyping and marketization of research, and blur the objectives of communication. Communication professionals embraced the funders' goals for societal impact, seeing the funders incentives as a helpful tool to compel science communication activities.

The preliminary results suggest that the general effect of changes in the way in which public communication and engagement, is perceived, defined and funded within the academia, may create challenges in generating a shared sense of purpose and identity amongst the numerous and short-term research projects, which can present fragmented images of research to the public, and cause unarticulated differences affecting the intersections amongst researchers and communication professionals.

Clare Wilkinson
The University of West of England, United Kingdom

887 Insight talk

Interactive Youth Science Workshops benefit student participants and graduate student mentors

Pallavi Kompella
The University of Texas at Austin, United States

jIn an increasingly complex world, scientific method becomes an indispensable tool for not just scientists but everyone. The Present Your PhD to a 12-Year Old (PYP) program at the University of Texas at Austin strives to provide additional avenues to learn this first-hand from pre-doctoral researchers. Since 2017, PYP has been hosting an annual Youth Science Workshop (YSW). In this interactive workshop, graduate students from diverse scientific disciplines introduce middle and high school students to their doctoral research and mentor them to develop a simple but creative white-board presentation for communicating key concepts to a wider lay audience. We evaluated the effectiveness of YSW on young students' attitudes towards science, scientists and academic research, through a pre-post retrospective.
This survey included five specific educational constructs: interest in science, intentions to persist in science, confidence in learning science, perceptions of scientists, and perceived usefulness of science. The results showed pre-post gains in their interest and attitude towards science, and their perception of scientists. Many students also reported that learning the scientific content, interacting in small teams and having an opportunity to present to their peers were their favorite aspects of the workshop. In addition, an interview with the participating graduate students to access their overall satisfaction with the YSW revealed that this experience significantly improved their communication skills and increased their interest in academia. The YSW is one of the first examples of a low-cost, short-duration outreach event with measureable positive outcomes amenable to all disciplines of science. Increasing the frequency of such events can contribute towards sustaining the positive outcomes and improving support for basic science research while engaging with the public to enrich their understanding of the scientific method. This model can be easily replicated by scientists at other institutions to globally enhance science outreach initiatives.

Brant Gracia
University of Texas MD Anderson Cancer Center, United States

Lucy LeBlanc
The University of Texas at Austin, United States

Greg Clark
The University of Texas at Austin, United States

860 Individual paper

Enabling decision-relevant debates about human genome editing

Nicole Krause
University of Wisconsin - Madison, United States

International attention to ethical and societal implications of human gene editing (HGE) is growing. A worldwide chorus of scientists, government organizations, journalists, and lay publics are calling for increased deliberation about the implications and responsible governance of HGE. However, concrete recommendations for how to implement public engagement with controversial science in real-world environments are scarce, and efforts are further complicated by media environments that encourage ideological fragmentation, spread of misinformation, and intensifying polarization.

To fill this void, our research explores strategies for facilitating productive discussions of HGE in practical settings, to encourage individuals to seek information that supports democratically healthy patterns of opinion formation and good-faith consideration of diverse viewpoints. A first experimental study examines the effects of two types of stimuli on information-seeking behavior: (1) a description of HGE as value-laden and controversial (or not), and (2) a manipulation of participants' perceptions of opinion climates such that they believe fellow participants hold views on HGE that are similar to their own, different, mixed, or unknown. Subsequently, participants have eight minutes to select from a menu of HGE news articles offering positive, negative, or balanced considerations in a general news, science news, or editorial format.

Our initial results suggest that priming individuals to the thorny nature of HGE discussions and variations in opinion climate significantly predict information-seeking and -processing strategies. We believe the information-seeking patterns catalyzed by our experimental stimuli can provide important insights into how public debate on this issue may evolve in the future, if or when new developments prompt the issue into a more prominent place within popular discourse. Further, these findings suggest that there may be clearly identifiable strategies for stimulating engagement with ethical and societal questions surrounding HGE that departs from all-too-familiar patterns of ideological fragmentation and polarization plaguing other scientific topics of public concern.

Emily Howell
University of Wisconsin - Madison, United States

Michael Xenos
University of Wisconsin - Madison, United States

Dietram Scheufele
University of Wisconsin - Madison, United States

Dominique Brossard
University of Wisconsin - Madison, United States

1153 Individual paper

How citizens make sense of Covid-19 and the practice of communicating science

Frank Kupper
Athena Institute, Faculty of Science, Vrije Universiteit Amsterdamty Amsterdam, Netherlands

The COVID-19 pandemic has created a situation that is enormously complex, rapidly changing, and impacting al our lives. When people are confronted with such an uncertain and ambiguous situation, they engage in sensemaking to answer the questions "what's going on here" and "what to do". Sensemaking is a socially constructed process or practice in which individuals interact with their environment to develop and understanding of a complex reality. Because the pandemic is so complex and emergent, information is often incomplete, fragmented, and contradictory. This poses significant challenges for people's sensemaking practices and the communicative practices of scientists, communicators and journalists.

In this study, as part of the EU-funded project RETHINK, we have investigated sensemaking practices of citizens across eight EU countries (Germany, Poland, Serbia, Italy, Portugal, UK, Netherlands and Sweden). We interviewed citizens that were confronted with the pandemic in a range of different situations. We applied Dervin's sensemaking methodology to focus the open-ended interviews on so-called "micro-moments", moments in which people are confronted with a gap in understanding of an ambiguous and uncertain situation. Together with our participants, we elaborated how they integrated their experience, knowledge, context and available sources to reach a momentary understanding of a particular issue.

We have performed over 80 interviews that have been analysed using a thematic analysis approach. Our preliminary findings show how participants often struggled to position themselves. Sensemaking processes were particularly shaped by an individual's personal experience and needs. Also, emotions, values, worldviews and relationships with friends, family or colleagues play an influential role.

Studying sensemaking in the context of the pandemic allows science communication scholars to better understand sensemaking practices, and to question current assumptions about communicative practices. Furthermore, it will provide new strategies for science communicators and journalists to build open and trustworthy relationships between science and society.

Tessa Roedema
Athena Institute, Faculty of Science, Vrije Universiteit Amsterdam, the Netherlands , Netherlands

Virgil Rerimassie
Athena Institute, Faculty of Science, Vrije Universiteit Amsterdam, the Netherlands, Netherlands

683 Insight talk

Science capital and the justice system

Oceane Laisney
University of Dundee - Leverhulme Research Centre for Forensic Science, United Kingdom

Within the justice system many individuals are required to make decisions relating to scientific evidence. In the case of a criminal investigation, many non-scientists are involved with evidence capture, communicating and decision making and their actions and understanding of the situation and the decisions they make is of prime importance since it impacts on criminal trials, convictions and sentencing. This project will explore how the understanding of Science capital might be applied in this environment. The concept of Science Capital has its origins in research in education (Archer et al., 2015), however the theory is gradually being applied to adult understanding, practice and policy in other professional areas.

This insight paper will outline our proposed approaches to considering Science capital in this ecosystem and how it might support effective communication and understanding of forensic science amongst professionals within the justice system. This will be the first time that Science capital has been considered in this sphere.

Results could lead to improving how scientific theories and practices are communicated between the various groups involved in decision making based on forensic science including professional non-scientists and scientists and forensic scientists and members of the public, including the jury. In conclusion, by closely examining the Science capital of professional non-scientists in forensic science and engaging these diverse groups, this project will shed new light on the neglected issue of decision making based on scientific evidence.

Archer, L., Dawson, E., DeWitt, J., Seakins, A., & Wong, B. (2015). “Science capital”: A conceptual, methodological, and empirical argument for extending bourdieusian notions of capital beyond the arts. Journal of Research in Science Teaching. https://doi.org/10.1002/tea.21227

Lucina Hackman
University of Dundee, United Kingdom

Heather Doran
University of Dundee,

655 Individual paper

What do evaluation practices reveal about the evolving career and working life of the public engagement professional? An exploration of government-funded research centres in Ireland.

Sylvia Leatham
Dublin City University, Ireland

The Irish government is investing millions of euro in scientific research, in an effort to boost Ireland's economic competitiveness. Alongside research obligations, institutions and researchers funded by the State are obliged to carry out public engagement activities. There are growing expectations that these outreach activities be evaluated – that is, measured in some way for impact or effectiveness. However, much evaluation activity is 'hidden' in unpublished reports to funders, and scholarly publications on evaluation are few and far between in Ireland.

Both the academic arena and the field of practice in public engagement suffer from a lack of agreed standards around evaluation: There are no generally agreed measures of efficacy, definitions of success, or even, at times, definitions of terminology.

An examination of the evaluation practices of publicly funded scientific research centres in Ireland – carried out during a master's in Science Communication at Dublin City University - aimed to identify current practices, establish common themes and highlight 'pain points'. A qualitative approach was used to thematically analyse the knowledge, behaviour and experiences of public engagement professionals employed by Science Foundation Ireland Research Centres. These Education and Public Engagement managers are responsible for the coordination, delivery and evaluation of outreach programmes on behalf of their research centres.

Analysis of ten semi-structured interviews resulted in six themes:

- Lack of resources
- Knowledge, expertise and training
- Qualitative data and evaluation as research
- Isolated autonomy and the desire to collaborate
- Approaches, methods and challenges
- Attitude and motivation

This study yields a partial insight into the working life of a public engagement manager in a third-level institute, combined with findings around evaluation practices, attitudes and behaviour in SFI Research Centres. Recommendations are presented for consideration by those interested in enhancing the evaluation skills, capacity and support for research centres and their public engagement managers.

1088 Insight talk

What about Responsible Scaling? Moving Science Communication beyond Responsible Research and Innovation

Cees Leeuwis
Knowledge, Technology and Innovation group, Wageningen University, Netherlands

Science communication has broadened to include communication with citizens in the process of research and technology development. Widely promoted approaches such as Responsible Research and Innovation (RRI) serve to make techno science more inclusive, reflexive, responsive and anticipatory with the aim to prevent the emergence of undesirable consequences. RRI is mostly applied in relation to ‘upstream research’, which reflects an assumption that the effects of science and technology are largely defined in the research phases. This is questionable since we know that users tend to adapt technologies, and that consequences of technology-use are contextually defined and mediated by institutional arrangements. Positive or negative effects do not only depend on the technology, but also on the societal rules and arrangements in which it is embedded.

The above implies that if we want to support responsible innovation, we need to also pay attention to the ‘downstream’ processes through which scientific results and technologies are translated and scaled through the communicative practices of e.g. development NGOs and other innovation intermediaries. Typically, such organisations works towards the ‘scaling of innovation’ as part of endeavours to achieve positive societal impact.

We argue that scaling efforts are often still informed by outdated individualist models regarding adoption of innovation and technology uptake. These models overlook the social interdependencies and institutional processes that shape the emergence of positive or negative outcomes, and hence do not adequately include considerations regarding responsibility. This frequently results in unsuccesful and/or undesirable scaling outcomes. We present an alternative theoretical conception of scaling processes that considers interactions between different societal spheres, and that builds on the observation that technology-use requires collective action and institutional change. Subsequently, we discuss how RRI may be complemented with Responsible Scaling. We discuss the contours of such an approach, and the implications for science and technology communication and innovation intermediation.

Noelle Aarts
Institute for Science in Society, Radboud University, Netherlands

957 Individual paper

The role of Greta Thunberg's discourse in the global conversation about climate change on Twitter

Bienvenido Leon
University of Navarra, Spain

In August and September 2019, world media coverage of climate change experienced a peak (Boykoff et al, 2019) that seems to be related to the strength of the citizen movement created by activist Greta Thunberg. This Swedish teenager fostered a change in the global discourse about climate change, stressing the climate emergency, and managed to mobilize young people around the world.

This research analyzes the relevance of the messages and references to Greta Thunberg in the world conversation about climate change on Twitter, a social medium that has been widely employed to spread this emergent movement. Through a content analysis that uses big data techniques, we have searched the terms global warming, climate change, climate crisis and climate emergency (in English and Spanish), during the period Sept. 16th to Oct. 6th that included the “New York Climate Week”, in which Greta Thunberg participated in the UN Climate Action Summit. By using this method, we collected over 6.300.000 tweets, 1% of which was connected to Greta Thunberg's discourse.

Using this sample, we have analyzed the main characteristics of the messages, in order to understand in what way the discourse of climate emergency fostered by Greta Thunberg has influenced the global conversation on climate change. Our analysis includes geographical origin, distribution along the sampling period and emotions (positive, negative or neutral expressions connected to Thunberg's discourse). We have also compared the results of the tweets in English and Spanish.

Results indicate that Greta Thunberg's discourse has played a leading role in the global conversation about climate change in the period around the UN Climate Action Summit. In addition, the focus on the climate emergency (rather than climate change) has played a key role in the twitter conversation about this topic.

María Carmen Erviti
University of Navarra, Spain

Pablo Urruchi
University of Navarra, Spain

Ana Martínez García
University of Navarra, Spain

665 Insight talk

Perception Makes Reality: Comparing Factors Influencing Public Risk Perception of Nuclear Energy in Singapore and Indonesia

Juline Lew
Nanyang Technological University, Singapore

In the search for alternative energy sources, some countries have shown interest in implementing nuclear energy, in what has been dubbed a “nuclear renaissance”. Yet, risk perception plays an integral role in influencing public support of nuclear energy.

In this study, we apply the cognitive miser model as the overarching theoretical framework. The model posits that people rely on mental shortcuts, such as trust and media attention, when making decisions on complex issues. We conducted a cross-country analysis investigating the effects of the variables within the cognitive miser model on the risk perception of nuclear energy. Data was collected from nationally representative door-to-door surveys of 1,000 respondents from Indonesia and 1,000 respondents from Singapore. The two Southeast Asian countries share geographic proximity, yet maintain different approaches towards nuclear energy. Findings revealed that in both countries, people who had existing positive feelings toward nuclear energy had lower risk perceptions, while subjective knowledge was positively associated with risk perception. Additionally, in Indonesia, trust in government, trust in non-profit environmental organisations, attention to TV news, elaborative processing, and contextual knowledge were significant predictors of risk perception. Conversely, in Singapore, risk perception was positively associated with trust in business leaders and content knowledge, and negatively associated with trust in international institutions. Interpersonal discussion and elaborative processing were also found to moderate the effects of media attention on risk perception in both countries.

Theoretically, this study contributes to existing literature on risk perceptions of nuclear energy by serving as a pioneering piece that specifically studies countries in Southeast Asia. It also builds on the cognitive miser model by studying which variables are more relevant in influencing risk perception. Practically, understanding risk perception in an under-studied cultural context enables stakeholders to make informed decisions pertaining to public communication of future nuclear-related information.

Shirley S. Ho
Nanyang Technological University, Singapore

756 Visual presentation

Communicating Quantum Mechanics to the Chinese Public: "A Guide to Roaming the Quantum World" Exhibition as a Case Study

Kun Li
Hefei TanAo Automation CO., LTD, China

Several years ago, the Chinese government decided that quantum technology would be a national priority for research and development. China constructed the world's first secure quantum telecommunications trunk line and then launched the world's first quantum technology experiment satellite. Following these achievements, public enthusiasm for quantum technology was at an all-time high. However, the concept of quantum mechanics is difficult to grasp for the public, as the microscopic and macroscopic worlds are governed by completely different physical laws. Moreover, quantum mechanics is not taught as part of the compulsory science education curriculum. Hence, beyond a passing familiarity with the word "quantum", most people do not understand what a quantum is or what its special characteristics are. Popular science exhibition planners are now concerned with the problem of how to communicate knowledge of quantum mechanics in an easily understandable format for the general public.

To address this issue, we have designed a temporary exhibition on quantum mechanics called "A Guide to Roaming the Quantum World" which references the style of successful commercial exhibitions in China. We employ gaming and immersive experience as our main methods, integrated with elements of the cultural trends and internet language popular among contemporary youth. At the same time, we restrict the use of abstruse technical terms and avoid textbook-style explanations. Exhibition visitors start off in the "What is a Quantum?" display area, and then move through the "World of the Atom", "Counterintuitive Universe", "Quantum Space", and "Applications of Quantum Mechanics" displays, which are designed to help them understand the definition, special characteristics, and applications of quanta. Along the way, visitors will encounter classic experiments such as the Schrodinger's cat and double-slit experiments, as well as presentations of China's quantum mechanics research, such as the Quantum Experiments at Space Scale program.

Hujun Yuan
Hefei TanAo Automation CO., LTD, China

831 Visual presentation

Constructing an Integrated Evaluation Index System for Science Centers in China

Xiang LI
National Acedemy of Innovation Strategy, CAST, China

As a key function of museums of science, technology and industry, improving the public's understanding of science (PUS) have been paid increasingly more attention by scholars around the world. In recent years, a global phenomenon in this field is that science museums have been science-centerizing obviously, including thousands of new constructed science centers and transformation from traditional science and technology museums to science centers. Numerous of science centers have been building in countries like China and Brazil, which without a profound history of museum construction. It not only helped to improve public's science literacy, but also challenged the traditional method of museum evaluation.

By analyzing the museum evaluation modes in UK, US, Japan, etc., this study concluded universality of assessment of museum and similar institutions. Simultaneously, the situation and policies of assessment of public service units such as library, cultural center and exhibition hall in China were also collected and analyzed. Furthermore, an integrated evaluation index system for science centers in China was built to examine the effect of their role in public understanding of science, which will mainly focus on museums' self-assessment and visitors' satisfaction. The evaluation index system is aiming at a classification of science centers in China. A preliminary investigation at national level will be conducted in China in early 2020 to examine the brand-new evaluation system, and the primary results will be presenting in the conference.

Fujun Ren
National Academy of Innovation Strategy, CAST, China

Xuan Liu
National Academy of Innovation Strategy, CAST, China

Xin Qi
China Science and Technology Museum, China

Liyuan Zhang
Peking University, China

614 Individual paper

Tracing the emergence and the development of Science Communication in a small island nation

Zi Zhao Lieu
The National University of Singapore, Singapore

The development of scientific communication movement in Singapore can be described in terms of an evolving and increasingly complex relationship between discourses about Science and its role in society, and the communication of Science and its ideas, through formal education and other forums. When Singapore became independent in 1965, the fledgeling nation had limited scientific resources and very little industrialization. Thus, one of the most urgent agenda by the new Singapore government was to build up human capital, trained in Science and technology to meet the demand of industrialization. To do so, the Singapore National Academy of Science was set up two years after independence to promote and cultivate keen interest for in Science and engineering among school children and the general public such that they will consider a future career in science and technology. Both the Science Centre Singapore and the Singapore Association for the Advancement of Science was instrumental in its early days to promote and communicate Science to the public. Since then, the Science communication movement has also grown from the initial concerns with the extrinsically motivated promotion of scientific literacy for economic needs to include more mature intrinsic concerns such as helping scientists to communicate their work more effectively. This story traces this evolution, highlighting how extrinsic and intrinsic motivations, as well as top-down and ground-up movements, have shaped discourses about Science, and the communication of Science, in Singapore.

Denise De Souza
Nanyang Technological University , Singapore

Letchumi D/O Mani
The National University of Singapore, Singapore

Koon-Peng, Glenn Toh
Nanyang Technological University , Singapore

Tzer-Liang, Benedict Lin
Nanyang Technological University , Singapore

613 Visual presentation

Cancer Misconceptions among Singapore Students

Zi Zhao Lieu
The National University of Singapore, Singapore

The widespread prevalence and persistence of misinformation in societies, such as the false belief that the constant use of the mobile phone will increase the rate of brain cancer or the use of herbal therapy are effective in treating cancer. For example, the myths surrounding cancer treatment or prevention, which may hinder proper treatment or prevention decision has led to an increase in the unnecessary public expenditure on research and public-information campaigns aimed at rectifying the situation. The general public, especially the younger generation, largely relies on the media, especially social media, to obtain knowledge and information about cancer. Such information is usually written by non-healthcare specialists and may oversimplify, misrepresent, or overdramatize scientific information. This study examines the level of cancer misconceptions among university students in Singapore and attempts to investigate the relationship between cancer misconceptions and healthcare communication channels. The general public, especially the younger generation, mainly relies on the media, especially social media, to obtain knowledge and information about cancer. Such information is usually written by non-healthcare specialists and may oversimplify, misrepresent, or overdramatize scientific information, which creates misconceptions among the receiver. Our data showed that certain cancer misconceptions do exist among university students, particularly among non-science majors. We also determined that new media and traditional media are both sources for such misconceptions, with the former affecting the tech-savvy younger generation more and the latter affecting the older generation. Furthermore, advertisement of healthcare products loaded with false or exaggerated contents are also a significant source of misconceptions.

Yih Cherng Liou
The National University of Singapore, Singapore

Mila Zhang
The National University of Singapore, Singapore

588 Visual presentation

Science Busking as a tool to transform public spaces

Zhi Han Lim
National University of Singapore, Singapore

Busking is the act of performing in public spaces. It is one of the oldest forms of public entertainment widely found in various cultures. As opposed to theatrical performances, audiences of busking are usually transient passerby who stopped in their tracks because they are attracted to the lively display. In converting a mundane everyday commute into a delightful experience, buskers and their performances leave deep and lasting impressions.

We adopted the idea of busking and developed it into a unique form of public engagement in science, to be conducted by our students of the National University of Singapore (NUS) - Australian National University (ANU) Joint Master of Science in Science Communication programme. We believe that Science Busking – a live performance of science demonstrations in public spaces, has the potential to transform people’s perception of science in a fun, spontaneous, informal and intimate environment.

Science busking has been carried out by our science communicators for three consecutive years at various locations with considerable success. In this conference, we hope to present our science busking experiences in the form of visual displays: poster, photographs, videos (if allowed) and live demonstrations (if allowed).

Robert Zi Zhao Lieu
National University of Singapore, Singapore

737 Visual presentation

Fridays for "Farm": Campus farming and the transformation of community agri-food conceptions

Chi-I Lin
National Sun Yat-sen University, Taiwan, Taiwan

Consumers' perception of food sovereignty has the power to shape the culture of agri-food commodity market, and moreover, benefits the health of the local farmers, the community, and the land. This study explores using campus-site farming practice as a communication strategy in increasing public awareness about current agri-food issues. It investigates the impact of the community farming practice on the participants' values and attitude toward sustainable agriculture. This study first discusses the operation of the campus/community small-scale farming. It will then look into the participants' concern about agri-food issues and their action for sustainable agriculture. In this study, there are142 participants including university students, staff, and local residents. Questionnaire survey and focus group interview are employed to collect research data through pre-tests and post-tests at the beginning and end of the semester. The text data of focus group interview transcripts are analyzed using content analysis. The results show that students' attitude toward community agriculture is positively related to values of "growing food by oneself", "buying food from the local regions", and "aesthetic appreciation". Also, campus/community farming and involves students to experience what can be done and how to do it regarding sustainable actions. This study concludes that campus farming facilitates a positive learning cycle through interacting with the locals. It suggests that campus/community farming acts as an effective strategy for communicating the values of sustainable agriculture.

954 Insight talk

Media Representations towards Nanotechnology in Taiwan-Agenda setting and framing

Pei-Ling Lin
National Taiwan Normal University , Taiwan

Nanotechnology (Nano) has become a popular applied science in the 21st century. Its popularity is manifested not only in increased research, resulting in a number of breakthroughs, but also in its increased use by commercial industries to produce “Nano products” that have sold well in recent years. However, even though researchers have become increasingly aware of the potential risks that Nano presents, the general public’s awareness of these risks has remained quite low. How should we frame our considerations and arguments about this emerging science, especially after being exposed to often conflicting news reports? Investigating the local development and variety of media attention toward emerging science and technology such as Nano is a worthy step toward figuring out the important factors that drive these relationships.

Research motivations include investigating agenda-setting activities (what themes in the Nano news were chosen as important issues?), and then investigating the framing effects on Nano news (how Taiwanese media represents the themes in different frames?).

The results showed the media representation of Nano in the Taiwan has been shaped as an emerging scientific idol which not only benefits public daily life but also increases the national interest and competitiveness of Taiwan. This is of concern, since there is little evidence that the public understands the risks associated with Nano.

Detailed text analysis results of an exploration of Taiwanese agenda setting and framing effects toward Nano by using news articles from The United Daily News database from 2002 to 2009 will be presented in the conference. Furthermore, in order to present the unique angles from Taiwan's media toward Nano, instead of using instruments, which are based on western media contexts (like US and EU), a new coding instrument which is located on Taiwanese media was developed by the authors will be provided in the presentation.

Chun-Yen Chang
National Taiwan Normal University, Taiwan

584 Insight talk

Is it time to escape? Examining "Escape Rooms' as science communication interventions

Hannah Little
Science Communication Unit, The University of the West of England, United Kingdom

Escape rooms are a recent cultural phenomena, whereby a group of players are locked in a room and must solve a series of clues, puzzles, or mysteries in order to escape. From an educational perspective, escape rooms have been praised for offering a more holistic, human centred and play-based approach to learning, which is able to capitalise on the influence of game-based learning but via a technique that is not technologically driven in the same way that most modern gaming can be. The existing literature on escape rooms has concentrated on their commercial role in tourism, or as a tool used in formal education but what new opportunities do they provide for science communicators? And might they play a role in widening participation around science communication? In this contribution, we will explore their growing use in informal science communication: in science centres and museums. We conducted a set of interviews with institutions running science-themed escape rooms across the UK and USA. We asked about escape room themes, aims and audiences. The interviews were audio recorded and transcribed, and analysed with an inductive thematic analysis approach whereby codes and themes were derived from the data. In this presentation, we will present our findings on the scope and objectives of escape rooms in science communication contexts. We have found a range of objectives ranging from communicating science, attracting underserved groups, and financial gain. Our study provides an initial look at the use of escape rooms in science communication contexts; outlining how they can attract specific audiences and engage them with scientific content.

Clare Wilkinson
Science Communication Unit, The University of the West of England, United Kingdom

678 Individual paper

Review of 70 Years Development of Science Communication in China: From the Perspective of Policy and Governance

Guangbin Liu
Beijing Institute of Petrochemical Technology, China

Abstract: 2019 marks the 70th anniversary of the founding of the People's Republic of China. From the perspective of the evolution of science communication policy system and governance mechanism analysis, this paper systematically sorts out the related policies over the past 7 decades. Through policy text analysis, combined with the historical statistics of science communication development, a comprehensive review of the evolution, main achievements and challenges of the science communication policy and practice in China are presented.

The evolution of science communication in China is roughly divided into four stages: institutional reconstruction, structural maturity, legal-system construction, and overall strategy upgrading. The paper also analyzes the era background and economic and social needs of the escalating national strategy of science communication in China, and structurally describes the promotion system of science communication policy in modern China.

The main achievements of science communication in China are summarized, including: a representation model of science communication social mobilization mechanism led by the government with public engagement; the sustained growth of national investments in science communication and the multi-development of funding channels; the steady development of science communication talent, etc.

The opportunities and challenges that science communication in China is facing at present are analyzed. From the practice of China, we can see that government attention is a key factor in development of science communication. Facing the new context of the new era, China's science communication will continue developing and prospering with Chinese characteristics.

Keywords: science communication, scientific literacy, science communication policy, science and technology innovation

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583 Insight talk

Empirical Analysis of the Leading Scientists in China Conducting Science Communication

Yang Liu
Institutes of Science and Development, Chinese Academy of Sciences, China

Science and China Lecture Tour by Academicians and Experts is a high-level and non-profit science communication activity, initiated by the Academic Divisions of Chinese Academy of Sciences and jointly sponsored by Chinese Academy of Sciences (China's equivalent of National Academy of Sciences in the USA, or the Royal Society in the UK), Publicity Department, CCCPC, Ministry of Education, Ministry of Science and Technology, Chinese Academy of Engineering and China Association for Science and Technology. Since its official launch in 2002, more than 1800 lectures have been delivered by the end of 2018. Science and China features activities conducting science communication in China, including Lectures on Local and Social Themes, Scientific Thinking & Decision, Primary and Secondary Students and Academicians Face-to-Face Communications, Lecture Tour by Academicians and Experts, etc. Based on the database from 2002 to 2018 of Science and China Lecture Tour by Academicians and Experts, this study aims to systematically summarize the characteristics of the science communication conducted by the academicians and experts as the leading scientists in China, with empirical analysis methods adopted, such as descriptive statistics and subject word analysis. The inherent laws and the development trend of the Lecture Tour are explored to figure out the main characteristics as well as the existing problems of the science communication by the academicians and experts, thus putting forward reasonable policy suggestions to help better conduct science communication activities in China.

Key words: leading scientists in China, science communication, policy suggestions

Yuqiang Liu
North University of China, China

Jianzhong Zhou
Institutes of Science and Development, CAS, China

945 Insight talk

Science Culture Survey in china: New insight of the innovation environment from the view of science and the public

Xuan Liu
National Academy of Innovation Strategy CAST, China

China has been conducted the Civic Scientific Literacy survey since early 1990s, which was mostly learned from Jon.D.Miller's scientific literacy model. However, the quits-like measurement can only reveal limit picture for the relation between public and science. Actually, the relation between science and the lay public lay down the crucial social environment for an innovation-driven nation. Hence, how to reflect the real status of the Cultural of Science in the society attracted more and more attention of the decision makers in the world wide. In that case, research team in NAIS.CAST, try to apply a new approach to assess the cultural environment for science and technology innovation from the public perspect. Therefore, the Science Culture study is launching in late 2019, the speaker would like to present the theoretical model for the Science Culture Index in China .On basis of the new insight of measurement of science culture, it will reflect not only the knowledge dimension of public attitude towards S&T, but including more indicators on how people value ,interests and engagement in S&T. Given the latest survey data in China, the speaker will also present major difference across regions and provinces of science culture in China from the public perspect. We hope this attempt could contribute a new solution for the national survey and research on public attitude towards science and technology in China.

Xiang Li
National Academy of Innovation Strategy,CAST, China

Fujun Ren
National Academy of Innovation Strategy,CAST, China

Jianquan Ma
National Academy of Innovation Strategy,CAST,

953 Visual presentation

The commucniation approaches for Large Scientific Devices open to the public: an empirical study on Chinese experience

Xuan Liu
National Academy of Innovation Strategy CAST, China

At present, the large scientific devices' opening to the public is mostly based on their own practices, and lack of summary analysis of the modes and mechanisms, which has important theoretical and practical significance.

Up to now, there has been no unified definition of large scientific device. The large scientific devices in this paper is a large-scale scientific and technological research facility open and shared by the scientific and technological community and the society for the purpose of making major breakthroughs in the frontier of science and technology and solving strategic, fundamental and forward-looking scientific and technological problems in economic and social development.

China has nearly 50 scientific devices in operation or under construction. The Chinese academy of sciences (CAS) is the main constructer. CAS has built 23 major scientific facilities, of which 21 are open to the public, including 5 public experiment platforms, 9 special research facilities and 7 public infrastructure facilities.

This study is based on empirical research on the 21 large scientific devices built by CAS. By selecting typical cases for comparative analysis, this study analyzes the opening capacity, opening activities and popularization results, and summarizes the path, mechanism and main problems. We found that large scientific devices have great potential to promote public understanding of science, but their development is uneven. Some of them have become international bases for science popularization and science education, while some are still seriously lacking in funds, personnel, methods and other elements of science popularizaiton. On this basis, this study put forward suggestions on how to optimize the mechanisms of large scientific devices' opening to the public, promote the integration of science and culture, and play a greater role in improving civic scientific literacy.

Jianquan Ma
National Academy of Innovation Strategy CAST ,

Guangbin Liu
Beijing Institute of Petrochemical Technology,

Xiang Li
National Academy of Innovation Strategy CAST ,

654 Visual presentation

Scientists' opinions and attitudes towards citizens' understanding of science and their role in public engagement activities

Carolina Llorente
Communication and Society Studies Centre, Pompeu Fabra University, Spain, Spain

The increasing perception that public communication in science and technology is an important tool to create a knowledge society is encouraging numerous public engagement activities. In Spain, every two years, the Spanish Foundation for Science and Technology (FECYT) analyzes the relationships between science, technology and society through a survey. However, little is known about scientists' understanding of the perceptions of the public regarding scientists' role in the research, development and innovation process or on Spanish scientists' actual understanding of the public. If we want to establish an effective dialogue between science and society, we need to be aware of the opinions and perceptions that both parties have of each other. In this study, we address this issue by focusing on 1022 responses to a survey conducted among scientists in Spain to discover their views of the public, and we then compare these responses with data from national surveys on the public's understanding of science.

The results show that approximately 75% of Spanish scientists think that the general public has a serious lack of knowledge and understanding of scientific reasoning, although scientists do recognize that science interests the public (73%). Scientists believe that the public values the scientific profession to a lesser extent than suggested by public surveys: on a scale of 1-5, survey respondents rate their valuation of the scientific profession at 4.22, whereas scientists rate the public's valuation of the profession at 3.12, on average. Significant differences were detected between scientists' perceptions of how citizens are informed about science and what citizens report in surveys. The challenge for the future is to narrow this gap in order to help scientists gain a better understanding of the public and their interests and to make public engagement activities more effective.

Gema Revuelta
Communication and Society Studies Centre, Pompeu Fabra University, Spain

Mar Carrió
Group of Educational Research in Health Sciences, Pompeu Fabra University, Spain

Júlia Alessandra Garcia Chillida
Communication and Society Studies Centre, Pompeu Fabra University, Spain

560 Insight talk

Public communication of science - not a priority of university PR in Taiwan

Yin-Yueh Lo
Shih Hsin University, Taiwan

Acknowledging the association between knowledge society and economic growth, the Taiwanese Government has begun to promote PCST. There is a call for more science popularization and other forms of interactions between science and the public such as dialogs and citizen science. Universities and publicly funded research centers outside the university system are crucial actors in science communication in terms of financial resources and access to scientists as knowledge-producers. This is particularly true in Taiwan because of its lack of quality science journalism. Yet, the science organizations' role in connecting science and society has received little attention in Taiwan so far. We therefore explored public information officers' understanding of their role and how science PR in Taiwan aims to connect science and the public. Twelve science PR professionals from 11 different organizations were interviewed. One result is that the priority of science communication – i.e. communication related to research – within the organizations' overall public relations activities is higher in the PR of research centers than in that of universities. The latter focus on their obvious relevance as educational institutions while the research centers' image depends on the excellence and social relevance of their research. Based on our preliminary results we argue that science PR cannot replace the observer role of science journalism but – considering the lack of quality science journalism in Taiwan – science PR may have a function in the provision of knowledge and in making science transparent to the public. Based on a grant from the Taiwanese Ministry of Science and Technology we currently continue our research with a more representative research design consisting of a content analysis of the websites of Taiwanese universities and research centers and a standardized online survey among PR professionals.

1030 Insight talk

Speaking science in 90 seconds

Joana Lobo Antunes
Instituto Superior TÃ©cnico, Universidade de Lisboa and Faculdade de CiÃªncias Sociais e Humanas, Universidade Nova de Lisboa, Portugal

In Portugal, we have very few opportunities to put science in the media, especially in television and radio. A 2011 study stated that only 0.8% of television news pieces in the four Portuguese public TV channels were about science and technology. On the other hand, we have a growing scientific community since the 90's, growing in people, productivity and quality.

In 2016, our team from Universidade Nova de Lisboa decided to produce a science daily show for national radio, featuring a new scientist each day, just 90 seconds long, running in afternoon prime time and repeating in the morning of the next day. Although this is a common format elsewhere, in Portugal it was the first show of its kind and it has now a longevity of over 3 years with daily programs, having so far put on air more than 700 scientists, with gender, geographic and scientific area balance.

The program "90 seconds of science" was born in Academia to serve the national purpose to inform the public about the knowledge being produced by Portuguese scientists. We have been able to be one of the top shows in the national radio, become a very important empowering tool for scientists and also giving most of them a first experience with the media, and at the same time making a portrait of our scientific community of these times. We have been able to gather two sponsors that have made us financially stable, and we have been awarded Acesso Cultura prize, for making science more accessible to audiences (2018), and Gulbenkian Prize, for bringing knowledge to society (2019). The program has been a tool for transforming academia and its relationship with society in Portugal, and we will discuss on ways to capitalize this potential.

Adriano Cerqueira
ITQB and FCSH, Universidade Nova de Lisboa, Portugal

Paulo Castanheiro
FCSH, Universidade Nova de Lisboa, Portugal

Paulo Nuno Vicente
FCSH, Universidade Nova de Lisboa, Portugal

Antí³nio Granado
FCSH, Universidade Nova de Lisboa, Portugal

879 Insight talk

Co-creation of Stories in Sound - Aotearoa New Zealand

Nancy Longnecker
Centre for Science Communication, University of Otago, New Zealand

Soundscapes are the soundtrack of our lives, enhancing the human journey by enabling deep feelings and engagement with the world around us. As our world experiences the extraordinary changes of a warming climate, its soundscapes will undoubtedly change as well. This project is creating a snapshot of sounds of Aotearoa New Zealand in 2020. The project involves co-creation, with collaboration of public participants, academics, people working in the New Zealand acoustics community, community radio and a Fulbright Specialist with a global audience of podcast listeners.

Stories in Sound encourages people to appreciate and interact with their environment by sharing stories of their local soundscapes, with attention to how those soundscapes have or will change over time. These soundscapes and their associated stories are being shared with a global audience through social media and Pulse of the Planet radio series and podcast and locally through community radio. We hope that the project’s outputs of stories about iconic New Zealand sounds and soundscapes will inspire people to value our environments. The project empowers and supports a storytelling community of practice made up of diverse members of the public as well as professional story-tellers.

Karthic SS
Centre for Science Communication, University of Otago, New Zealand

Jim Metzner
Pulse of the Planet, United States

Alison Ballance
Radio New Zealand, New Zealand

Sarah Manktelow
Centre for Science Communication, University of Otago, New Zealand

Andrea Liberatore
Centre for Science Communication, University of Otago, New Zealand

870 Visual presentation

Aotearoa New Zealand - Moving to participatory science and bicultural knowledge communication

Nancy Longnecker
Centre for Science Communication, University of Otago, New Zealand

A pictorial overview is provided of development of science communication in Aotearoa New Zealand from our chapter in the 2020 book, The emergence of modern science communication, edited by T. Gascoigne. We explore aspects of the science communication ecosystem in NZ, as well as drivers behind a shift towards more participatory science and science communication. New Zealanders have a strong history of acting firmly and independently, as demonstrated by the banning of nuclear-powered or armed ships in 1984 despite the country's strong alliance with the US. Aotearoa New Zealand's strong kaitiaki (guardianship) ethic, especially amongst Maori, but also amongst non-Maori New Zealanders, has empowered environmental activism. For example, the successful Save Manapouri Campaign ran from 1969 to 1972; not only did it prevent the raising of the level of Lake Manapouri for construction of the Manapouri Power Project, it also influenced the results of a federal election.

One particular aspect of interest is how NZ has moved to accept the value of indigenous knowledge ahead of other countries. Recent decades have seen a significant shift in the way in which indigenous knowledge, knowledge systems, and engagement processes are respected and incorporated into nationwide funding, research practice and public engagement., NZ has aVision Matauranga policy which recognises the potential of matauranga (Maori knowledge, culture, values and world view) and its value to current research projects.The Ministry of Business, Innovation and Employment holds that Vision Matauranga 'unlocks the science and innovation potential of Maori knowledge, resources and people' (MBIE, 2018). Matauranga and new dialogic approaches have complemented and added depth to established practices in science communication such as conferences, science festivals and social media. Maori have taken science communication in Aotearoa NZ in new directions, with an increasing emphasis on the inherent values of the science being communicated.

Jean Fleming
Centre for Science Communication, University of Otago, New Zealand

Nancy Longnecker
Centre for Science Communication, University of Otago, New Zealand

Rhian Salmon
Centre for Science in Society, Victoria University of Wellington, New Zealand

Daniel Hikuroa
Department of Maori Studies, University of Auckland, New Zealand

752 Insight talk

Lab Enigmas: Immersive games to communicate science

María Eugenia Lopez
Centro Cultural de la Ciencia, Argentina

In developing a dialogue around science topics, research has shown that citizens need a safe space in which to have meaningful conversations. We know that positive learning environments can be created through games because they facilitate social interaction and generate motivation through engagement and reward, while allowing participants to make mistakes.

Taking this into account we created Lab Enigmas, an immersive game in an escape room format, where participants use scientific practices and reasoning to solve puzzles. In this insight talk, we explore the advantages and disadvantages of employing this format in a science center such as the “Cultural Center for Science” located in Buenos Aires, Argentina.

Our specific aims were to (a) attract young and adult audiences, (b) foster a taste and interest in science, (c) communicate science as a collective adventure, and (d) get participants in touch with scientific practices and reasoning. The visitors’ reception was positive, we managed to attract adolescent and adult public and we were able to verify, through a survey, that our communication goals were met successfully. Lab Enigmas was implemented for more than one year and the events were always sold to capacity. Players discovered patterns, communicated their findings, changed their opinion when evidence was shown, and found creative solutions while having fun. Most importantly, participants demonstrated an understanding of science as a collaborative endeavor and developed positive attitudes towards scientific reasoning.

After Lab Enigmas was launched, we were approached by other institutions who wanted to build their own immersive experience with similar goals. We moved forward developing another game, this time with forensic theme, and we are currently running pre- and post-tests to study public perception of science. Ultimately, we feel the effective communication of science through the transformation of a popular form of entertainment is a model that should be replicated.

Leonardo Svarc
Centro Cultural de la Ciencia, Argentina

1016 Individual paper

Youth in museum-led Citizen Science - participation in scientific research, science education or public engagement?

Julia Lorke
The Natural History Museum, London, United Kingdom

The concept of citizen and community science (CCS) has been attributed with the potential to democratise science, enabling everyone to take part in scientific research - embodying the participatory turn in the relationship of science and society. To examine the reality of CCS, we investigate youth participation in BioBlitzes led by three Natural History Museums. BioBlitzes are contributory CCS events which organise volunteers to record all species of organisms in a bounded space. How do young people actually participate (Lave, 1991) in BioBlitzes; do they contribute data to scientific research or is their participation more similar to science education or public engagement programmes?

We observed 96 young people in 16 BioBlitzes. The iterative analysis of our ethnographic fieldnotes revealed that in 83% of the observations, youth engaged in scientific practices (NRC Framework, 2012) with respect to the CCS activities. We saw some young people participate in all the necessary steps to generate a biological record. However, participation in exploration (49%) and observing (51%) was more common than in identifying organisms (28%) and documenting findings (15%). Participation in recording was especially rare (10%). This low frequency of recording is alarming as this is the crucial step in data collection for CCS. If the data is not recorded, it cannot be used for scientific research or monitoring; therefore, we argue that recording distinguishes authentic CCS participation from other types of science education and public engagement. Participation in these may be very impactful, but in the case of young people in BioBlitzes, CCS is not living up to the claim of enabling everyone to take part in scientific research.

To address this issue, we have embarked on a design-based research process allowing us to develop and test design features aiming to increase young people’s recording at BioBlitzes, and thereby their participation in authentic scientific research.

Heidi L. Ballard
University of California, Davis, United States

Maryam Ghadiri Khanaposhtani
University of California, Davis, United States

845 Visual presentation

Cambridge VERY short

Alina Loth
Berlin School of Public Engagement and Open Science, Germany

In our digital world, communication becomes increasingly more fast-paced. Visuals are often key in drawing attention and conveying information to new and wider audiences. Animated gifs are a relatively new technology that links the gap between stationary images and video formats. Gifs are used through a variety of digital channels (e.g. social media, blog posts, websites, news stories) as well as integrated in more traditional engagement methods (e.g. talks, poster presentations, exhibitions, festivals). This gives them great potential as a tool for research communication and engagement. The short format forces storytelling to the extreme of often one repeated movement while allowing for endless creative styles and interpretations. This makes animated gifs a very flexible visual tool suitable for almost any audience. During the visual presentation format of the conference, we would like to present the animated research gifs co-created between University of Cambridge researchers and visual artists. While each gif has its very own story and style, they all play with the limitation of time and complex content. The gifs are the result of a facilitated creative exchange where researchers and creative professionals develop visual ideas and build up partnerships. Established teams continued working together over the course of several weeks. The finished animations are presented as part of the Cambridge Science festival, in social media campaigns, talks, as well as in print through flipbooks and picture galleries.

Diogo Gomes
University of Cambridge, United Kingdom

963 Insight talk

Cambridge Shorts: Turning excellent research into engaging films

Alina Loth
Berlin School of Public Engagement and Open Science, Germany

We present a selection of short research films from the most recent Cambridge Shorts competition and critically discuss the assessment of their potential for public engagement. Cambridge Shorts brings together early career university researchers and creative filmmakers to visualise research processes and outputs through the medium of high-quality short films. In an increasingly digitised and networked environment, short films can capture a viewer's imagination and curiosity, and present an ideal entry point to the communication of cutting-edge research to wide audiences. After a competitive application process, researchers are supported in drafting innovative, accessible and engaging research stories in a guided co-production process. Filmmakers are recruited through open calls, film festivals (including Watersprite, the student film festival), and Film Studies Departments. The co-production experience of the short films pushes beyond traditional filmmaking to enable a dynamic process with high quality, creative, and innovative outputs. Networking sessions between filmmakers and researchers throughout the project period enabled a creative exchange, which resulted in accessible and engaging stories via cinematic media. Interacting with filmmakers and artists allows researchers to develop visuals and narratives that transform the traditional research story. At the same time, it improves research communication skills and builds researcher confidence. In turn, filmmakers learn to visualise complex processes, mechanisms and outcomes in a short, visually compelling product. The process enables a profound understanding of creative and cross-disciplinary collaboration. The resulting films have been recognised nationally and internationally: Pain in the Machine received online media coverage and won the AHRC Best Research Film of the Year Award, Morphogenesis was discussed in a Nature Plants article, and Dish life was awarded third place in the Raw Science Film Festival 2016. After Cambridge Shorts, several of the teams have continued to collaborate in subsequent film projects.

Diogo Gomes
University of Cambridge, United Kingdom

1061 Visual presentation

Science versus alternative "facts": Rolling the GMO debate

Ivan Lukanda
Makerere University, Uganda

The debate on using genetically modified organisms/ food (GMO/Fs) to feed the growing world population has been taking a prime position in resonance to the mounting challenge of climate change. On the menu of concern are issues of a scientific, economic, political and social nature, amidst foreign influence energised by internet-dependent information sources. These issues may facilitate, derail or cause the complete rejection of GMOs in a country. Yet models linking these issues in a national and/or perhaps a global context are rare, an objective the current study attempts to achieve. Using content analysis of stories published in two Ugandan newspapers, a face-to-face survey with the public, and in-depth interviews with scientists, politicians, journalists and civil society, the study demonstrates how the different actors position themselves in rolling the debate on this contested science supported and opposed at the same time to create a ‘global controversy’. The issues from the content analysis and the face-to-face survey were analysed using statistical Stata and the issues from in-depth interviews were coded using Atlas.ti software. The synthesis of issues births an economic-media chain model to explain the multifaceted nature of GMO science. A graphic illustration of how this proposed model can help the public understand the debate on GMOs will presented.

875 Visual presentation

Ouroboros: science, art and inclusion

Karina Lupetti
Federal University of São Carlos, Brazil

The mission of the Ouroboros Nucleus of Science Communication since 2005 is to perform cutting-edge research on the interplay between scientific communication and arts, as well as using the outcomes of the research to benefit the general public. This visual presentation is aimed at providing examples of how different Ouroboros projects have had a central role for 15 years now as a life-transforming driver for people engaging in these activities. Participants are led to communicate science in inclusive approaches by means of theatrical plays, musical performances and illustrations. On the one hand, protagonists are improving their personal skills in humanized projects that allow the management by competences, while on the other the limitations of each participant is always taken into account, since most of them are either visually impaired or have reduced mobility. Projects also include undergraduate and graduate students as well as professor from UFSCar, leading to a rich and diverse range of skills, training and worldview, rendering the creative process of each cultural product intrinsically dynamic and covering a wide range reflections about science and its importance to society.
Our practice with the public communication of science along these years has posed the challenge that empathy towards the participants from several different social backgrounds, especially those with physical disabilities, and the respect for their social demands should always be developed. The respect for the social diversity of the group over the years should be viewed as having a central role in defining how science and the many cultural manifestations are blended together and presented in plays, musical performances and other cultural meetings, always promoting different levels and types of discussion, fostering curiosity about science and scientists. In conclusion, these social technologies provided unexpected transformative paths, allowing people to be relocated in society.

Andre de Moura
UFSCar, Brazil

1047 Roundtable discussion

Preparing Scientists to Span the Boundary Between Science and Society

Brenda MacArthur
Alan Alda Center for Communicating ScienceÂ®, Stony Brook University, United States

Given the necessity for societal trust in forensic science, this panel will focus on how communication researchers can help forensic practitioners develop robust methods for delivering scientific information through better understanding of numbers and communication training. First, we will begin with a discussion of why probability and statistics are essential to accurately assessing the value of forensic scientific evidence, facilitating the delivery of justice, and maintaining a fair society. In court, this numerical information is extracted and adjudicated by non-experts such as lawyers, judges, and jurors. We will provide an academic perspective on working with these stakeholders to ensure research questions and educational tools are tailored to their needs, to help them feel confident in understanding and communicating numbers. We will provide insight into the challenges that researchers encounter when navigating the legal domain, and some catastrophic historical examples of when everything goes wrong. Second, we will introduce a forensic practitioner perspective and discuss the communication of scientific evidence through various stages from the crime scene to the courtroom. We will highlight the challenges that practitioners face in delivering scientific information to a broad-range audience, including limitations of the current systems. Third, we will conclude with a discussion of how communication research can be translated to practice and used to develop evidence-based curricula that train scientists to best communicate with different audiences. We will draw comparisons from best practices identified in health communication training, and share personal training experiences to highlight important successes and pitfalls in implementation and evaluation from both trainers' and scientists' perspectives. As researchers and practitioners in science communication, we have a responsibility to stand united in service to scientists who span the boundary between science in society. This panel highlights the power of communication to transform science-society relations.

Laura Lindenfeld
Alan Alda Center for Communicating ScienceÂ®, Stony Brook University , United States

Harry Gray
Leverhulme Research Centre for Forensic Science, University of Dundee, United Kingdom

1111 Visual presentation

Transforming young minds: designing activities to enthuse young people about science and collecting their feedback

Donna MacCallum
University of Aberdeen, United Kingdom

Public communication of science and technology targets various audiences, including children. At events where science is communicated to the general public, such as open doors events at research institutes, families often attend and it is important that any communication involves all ages. However, children can be a challenging audience to engage. Experience shows that children often engage more with science and technology when they are doing; therefore, one of the challenges of including children as an audience in public communication of science and technology is to design activities for children (4-11 years old) which will illustrate the science or technology being discussed. In this presentation, simple hands-on activities to illustrate genetics and microbiology discussed. In addition, it is important to obtain feedback from audiences to evaluate how effectively we have communicated our research. With adult audiences, it is easy to ask questions and obtain written answers; however, it is important to also obtain feedback from children in the audience. With children of varying age groups, more visual means to collect feedback are required. Our child feedback forms will also be discussed as a means of evaluating how effectively our science has been communicated.

557 Visual presentation

Brazilian Science on Air: a case report about the development of podcasts to National Council for Scientific and Technological Development (CNPq)

Ana Paula Machado Velho
State University of MaringÃ¡ - Brazil, Brazil

The article presents the creation of podcasts about science to CNPq (Brazilian Council for Scientific and Technological Development), one of largest science funders in Brazil. The production was sponsored by the Scientific Communication and Dissemination Program (PDCC - CNPq), which awared science communication professionals with scholarships to promote the CNPq actions of impact. The article describes the development of podcasts approved by the program, available online in plataforms like SoundCloud and Spotify. The programs considering the oral and conversation style to bring relevant topics about brazilian science and scientific dissemination to society. Among the covered topics we recorded episodes dealing with pioneer women in science, scientific curiosities for children and youth and other themes related with the Brazilian scientific production. This production meets the demand for content indicated by recent research on Brazilian public perception of science and technology – organized by the Ministry of Science, Technology, Innovations and Communication and the Center for Management and Strategic Studies. The report showed that media consumption about Science and Technology has dropped in newspapers, print magazines and television and remained very low in radio channels and book reading. This opens perspectives for experimenting the creation of content to alternative, digital and online plataforms. The data also confirms that 88% of people do not remember or do not indicate any scientific research institution, even universities (CGEE, 2019), the lowest rates in Latin America. This national context indicated how important it is to invest in science and technology dissemination and to put into perspective the role of science education and popularization.

Tiago Franklin Rodrigues Lucena
State University of Maringà¡ - Brazil, Brazil

Sonia Cristina Soares Dias Vermelho
Federal University of Rio de Janeiro, Brazil

Isis Nóbile Diniz
Institute for Energy and Environment - IEMA, Brazil

728 Insight talk

Public communication and social appropriation of science in Mexico

Patricia Magana
School of Sciences, Universidad Nacional Autonoma de Mexico, Mexico

Scientific research and public communication of science and technology (PCST) in Mexico have been historically supported with public resources and governmentally regulated through the National Council of Science and Technology (Conacyt).

Until 2018, Conacyt defined the social appropriation of science and technology (SAST) as "those processes carried out by users [non-scientific communities] through the exploitation, adoption and informed, or even creative, use of scientific, technological and innovation knowledge and objects". This was differentiated from PCST, defined as all the activities and processes performed by public science communicators.

Under guidance of the current Mexican government these definitions were modified by Conacyt, equating SAST activities to PCST activities. The administration also changed the ideals and guidelines of the scientific endeavor of scientific institutions by giving more importance to the so-called “social use” of science. This had consequences for the entire scientific community, including PCST practitioners: such as changes to the application calls for funding projects and introducing SAST as a quantitative or qualitative evaluation tool. However, two years after this change it is still not clear if the PCST activities will be assessed by the SAST results alone. The aforementioned changes have led to conflicts between the government and professional science communicators.

This presentation tries to assess this issue and give new perspectives on it by reviewing how SAST and PCST are conducted in other countries and funding systems. It also seeks to point out and clarify the differences between the PCST and the SAST, a definition exercise that could help to reach a consensus between the administration and practitioners. Furthermore, it examines different approaches in fulfilling the new requirements for funding applications in order to continue PCST activities.

Patricia Magana
Physics Department, School of Sciencies, National Autonomous University of Mexico ,

1127 Visual presentation

The light at night: our convenience, birds' peril

Shalie Malik
Department of Zoology, University of Lucknow, India

How strange it would be to wake up to a world without birds!

Our morning begins with bird song but we never recognize or acknowledge it, yet they keep the nature in balance and take care of our ecosystem, which is an interrelated natural community of flora and fauna.

I work on biological timekeeping (Chronobiology) in birds and therefore got interested in studying how use of technology, that has dramatically impacted human life, has influenced the wildlife specially birds. Of all the technological innovations, the advent of artificial light has been the most dramatic event. It has obscured day-night differences, leading to extended day, increased work hours and changed pattern of our social life. We are now free to 'chose our day' within 24h. However, what is good for us may not hold true for birds.

The bright nights have disturbed the natural behavior of birds. Every year millions of birds die colliding with illuminated buildings and towers and the migrants that navigate by moonlight and starlight, wander and move towards the dangerous landscapes of cities on seeing the bright light at night. The nightlight has altered the perception of daylength than they actually are and shifted the onset of various physiological events such as migration, reproduction, foraging, nesting, song and sleep behaviors.

These findings can be useful for experts in the field, wildlife department, urban development authorities and policy makers to plan out the judicious use of technology for betterment of both man and wildlife. We need to think, discuss and analyze the impact of technology on the timing of life events and make planet earth a better place for birds to live, as is rightly said "if you take care of birds you take care of most of the big problems in the world".

Sangeeta Rani
Department of Zoology, University of Lucknow, India

702 Individual paper

Foot and mouth disease ready? How relationships between Australian livestock producers and other animal health stakeholders are being transformed to improve disease preparedness

Jennifer Manyweathers
Graham Centre for Agricultural innovation (Charles Sturt University and NSW Department of Primary Industries), Australia

By promoting mutual trust, and inclusion of multiple sources of knowledge and experience, the Agricultural Innovations Systems (AIS) framework is transforming how improvements in animal disease management are achieved, through a four year pilot study in Australia.

Traditional approaches to improving disease monitoring and reporting typically follow a linear research-extension-adoption model. This has not been effective in addressing complex issues involving multiple stakeholders with competing priorities, such as animal disease management. Instead, an AIS approach has been adopted to enhance Australia's preparedness for a foot and mouth disease (FMD) outbreak.

The project brings together livestock producers, veterinarians, livestock agents, abattoir representatives, social scientists, etc., to tackle complex issues around animal disease monitoring and trusting relationships, one conversation at a time.

The FMD Ready Farmer-led surveillance project, working with five different livestock industries, flips the traditional top-down deficit model approach to improve disease monitoring by including multiple stakeholder voices to transform how knowledge is co-created, valued and shared. This pilot study will contrinbute to the development of a model approach for addressing other complex scientific and social issues, reaffirming the importance of evidence-based science communication best practice.

This project is supported by Meat & Livestock Australia (MLA), through funding from the Australian Government Department of Agriculture as part of its Rural R&D for Profit program, and by producer levies from Australian FMD-susceptible livestock (cattle, sheep, goats and pigs) industries and Charles Sturt University (CSU), leveraging significant in-kind support from the research partners.

The research partners for this project are the Commonwealth Science and Industrial Research Organisation (CSIRO), CSU through the Graham Centre for Agricultural Innovation, the Bureau of Meteorology (BOM) and the Australian Department of Agriculture, supported by Animal Health Australia (AHA).The project commenced in July 2016 and will conclude in June 2020.

Yiheyis Maru
CSIRO, Australia

Lynne Hayes
Charles Sturt University, Australia

Barton Loechel
CSIRO, Australia

Jennifer Kelly
CSIRO, Australia

1146 Insight talk

Metaphors, visual design, and discursive practice of science communication in the time of pandemic

Bryan Joel Mariano
University of the Philippines Diliman, Philippines

The Philippines has a long history of colonial influence and this includes the realm of science and technology. A tracing of historical conjunctures of science communication in the Philippines reveals an understanding of post-war regime and how colonialism has affected the overall psyche of Filipinos (Montemayor, Navarro and Navarro, 2020). In the time of COVID-19, violence- and war-related metaphors are being used as a strategy of communicating pandemic response by many countries. The Philippines is not an exception, as it employs a militarized response in the present (Quijano, Fernandez and Pangilinan, 2020), as it did in the past public health response (Vallejo and Ong, 2020). Apart from the government, artist-led groups have self-organized a campaign to communicate ways on flattening the curve through art and design. This paper explores the interface of metaphors and visual communication in framing and conveying messages on COVID-19 among the Filipino public, including its underlying socio-political structures that shape the current discourse and practice of public health response.

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920 Individual paper

Time inside the Dome: How astronomical time is depicted and communicated in planetarium sessions

Joana Marques
University of Macau, China

Cosmological time, and the connection between time measurement and astronomical events, are central to astronomy and astronomy communication, yet people's use of time concepts in astronomy outreach activities have not received sufficient attention in the research literature. How is time depicted and communicated in outreach contexts? In this paper we present an analysis of the communication of time concepts in planetarium sessions. We studied more than 20 events in different Portuguese institutions (the Geophysical and Astronomical Observatory of the University of Coimbra, the Museum of Natural History and Science of the University of Lisbon, and various schools in Portugal). Participants in these sessions varied: school children between 3 to 12 years old, families and adults. Data were collected during the summer of 2019. Taking Ethnomethodology and Conversation Analysis (EM/CA) as our approach, we analyse instances of actual events in planetarium sessions. EM/CA consider social reality and meaning-making as phenomena achieved and produced by the participants. Transcripts from recordings of these sessions enabled in-depth study of how concepts were communicated. Studying real-world occurrences in detail reveals the taken-for-granted work (the natural actions and interactions) done by people to produce those events, such as talking about astronomic time in the planetarium. By presenting the concepts people use affords exploration of differences and similarities in temporal concepts between public and communicators. Our analysis reveals that people make sense of time through their in situ work of making an astronomy outreach activity happen. In the data analysed, a frequent aspect concerning time and time concepts is the connection between time and the periodicity of celestial movements. Time is a ubiquitous concept, perceived and available interactionally. Therefore, detailed study of real events can certainly be applied in other areas to reveal how, in practice, time is communicated and understood.

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Ricardo Moutinho
University of Macau, China

Andrew Carlin
University of Macau, China

Miguel Gomes
Natural History and Science Museum of the University of Porto, Portugal

667 Roundtable discussion

Social labs as transformative approach to implement Responsible Research and Innovation

Ilse Marschalek
Centre for Social Innovation, Germany, Austria

The notion of Responsible Research and Innovation (RRI) reflects the changing relationship between science and society and calls for transformations of science-society relations. An open and transparent process is regarded as crucial for good scientific practices. While the inclusion of societal actors in research processes is becoming more important, the ways diverse stakeholders are included are still in development. Innovative and appropriate, which allow for real engagement and co-production of knowledge still formats need to be explored.

The New HoRRIzon project, funded by the EC, aims to further integrate RRI in research and innovation systems. It addresses RRI practices by focusing on the 19 funding programme lines of the EC. By bringing together stakeholders from the different fields of the programme lines from all over Europe, the project engages them in participative processes, in so-called Social Labs. A Social Lab is not a method, but rather a paradigm which is social, experimental and systemic that opens up space for reflection and discussion, developing new ideas and further implementing and assessing them. A Lab thereby consists of a series of workshops, enabling a highly participative process. The diverse stakeholders involved act on an equal and collaborate basis throughout the process of the Social Lab. Each of the Labs allows for an approach of doing, rather than just planning by using experiments and prototypes and involving most diverse groups of people and finally implementing the selected activities in pilot actions.

In the context of the New HoRRIzon project, we have adapted the Social Lab approach and used it as a tool to implement public engagement within an RRI process. Each Social Lab has co-designed several pilot-actions that are – with the support of the group – implemented and managed by the participants themselves.

Joshua Cohen
University of Amsterdam, Netherlands

Elisabeth Unterfrauner
Centre for Social Innovation, Austria

Eileen Focke-Bakker
Delft University of Technology, Netherlands

864 Visual presentation

Theme parks as science communication spaces: the EPCOT case

Daniela Martin
ITESO, Mexico

Science and technology have become tools to legitimize messages on a desired future that affect the world in terms of society, politics and economy; and cultural institutions have played a great role in this practice. By their nature, these spaces employ persuasion and entertainment strategies in their narratives to attract and arouse public interest. In this sense, scientific-technological theme parks have been propitious places for the communication of science and technology through modernity.

This paper presents the results of a study that analyzed the symbolic construction of the future in the scientific-technological discourse of four attractions at EPCOT theme park in Orlando, Florida. The discourses were analyzed based on the theoretical and methodological approach by John B. Thompson, which involves three phases that are not subsequent but intertwined with each other. The first phase involved a sociohistorical analysis of the production conditions of company, the theme park and each of the attractions. In the second phase, each transcript was systematized and analyzed to respond to the conventional, structural and referential aspect of the symbolic production of the future. This analysis, combined with the sociohistorical analysis, provided enough information to proceed with the third phase: the analysis of the intentional aspect or interpretation/reinterpretation.

EPCOT has become a landscape in which corporate visions converge with the political and historical reality of the US and the world. It presents a narrative in which progress is presented as one without disruption, uncertainty or complexity, in order to secure a privileged and exclusively positive symbolic position in the collective imagination regarding the role of science and technology in the world. This theme park is therefore a device providing education and training to consumption by introducing a sample of how social life is transformed through the consumption of the technology that is showcased.

Daniela Martin
ITESO,

1151 Individual paper

Narrative analysis about facemask wearing at the COVID-19 time: perceptions of a basic tool with significant socio-cultural implications

Lucia Martinelli
MUSE - Science museum, Italy

Individual and collective responsibility, trust in the institutions and credibility of the public health communication are crucial to motivate citizens to adopt/refuse the mandatory measures aimed at containing SARS-CoV-2 spread. Besides lockdown and physical distancing, facemask wearing is a main public health measure recommended. Although a “simple” protection tool, facemask can be understood as a sophisticated technological devise because of the load of personal and social perception attributed to its use/not use. A better understanding of citizens’ perception toward this personal protection device is required to design effective health communication to motivate the acceptability of the policies to contain present pandemic, as well as future global crisis. With this purpose, focusing on the facemask wearing, in May 2020, we collected observational testimonies from 29 scholars, members of an interdisciplinary research network on health and society, leaving in 20 European countries, South Korea and China. Participants wrote open-ended texts, answering to questions regarding rules adopted in their country, individual/personal attitude and practice, their view about other people behavior, and interpersonal interactions. The narratives (collected as an open source for research purpose: https://data.mendeley.com/datasets/9s6fm7vdbc/1) were analyzed thematically with the method of qualitative descriptive analysis. They are valuable commentaries describing national public health regulations, personal facemask use, and behaviors of citizens in various countries. This study highlights how social and personal practices of wearing (or not) face masks are influenced by individual perceptions of infection risk, personal interpretation of responsibility and solidarity, cultural and religious tradition, personal interpretations of social and cultural norms and need of expressing self-identity. Interestingly, the facemask was also described as a visual communication tool and a new way to communicate during times of lockdown and isolation. Finally, wearing (or not) face mask showed to be an ideological symbol and to have a strong political meaning.

686 Insight talk

Personal and social implications of genomic knowledge

Lucia Martinelli
MUSE - Science museum, Italy

How much do we know, would we like/fear to know about our physical and psychological genetic traits - whether we like them or not - and about talents and diseases recurring in our families? Is it a question of a "destiny" marked by genetic inheritance, life styles or epigenetics? The growing technology and knowledge about human genome is discovering markers for genes involved in diseases and may anticipate predisposition awareness. Genomic information is available in genetic tests also accessible on the Internet. Regarding health, the easy access to this knowledge offers both opportunities and difficult choices, and the risk of a new genetic determinism. During the 2018 and 2019, we collected a number of visitors" narratives regarding visions and concerns about their own genetic predispositions, traits, attitudes and personality. These stories of "everyday-genetics" were written by the public on a notebook in the main MUSE temporary exhibition "The Human Genome. What makes us unique". The notebook was displayed in a cozy corner of an immersive scenography reproducing a square to engage museum's visitors in the private and the social implications of genomic technology development, and to stimulate their willingness to share their intimate stories. Here, visitors could hear narratives we conceived ad hoc: they were inspired by real cases available in the scientific literature, in the media, and on the Internet and websites of medical and patient organizations. The confidences left by our visitors are a fresh collection about citizens" awareness and knowledge on personal genetics and offer interesting feedback to better develop public our engagement activities regarding biomedical topics. Moreover, in our projects involving stakeholders of the medical field, they can give interesting insights to support a patient-centered medicine based on a better knowledge of citizens" feelings about their own genetics and may contribute to a more empathic patient/medical doctor communication.

Lucia Martinelli
MUSE - Science museum, Italy

Patrizia Famí
MUSE - Science museum, Italy

1054 Visual presentation

Social inclusion through public policies of science communication in Brazil: possibilities and limits

Tatiana Martins Venancio
University of Sao Paulo, Brazil

Public Policies (PP) focused on science communication are essential if science is to be part of culture. In addition to numerical insufficiencies, PP of this nature have been inadequately studied and so little is known about their impact and effectiveness. In 2003, Brazilian Science, Technology, Innovation and Communication Ministry (STICM) created the Secretariat of Science and Technology for Social Inclusion (SSTSI) with the purpose of promoting public policies that enable social inclusion through the actions of dissemination of knowledge and technology transfer to populations in poverty and / or social vulnerability. Since 2003 STICM and SSTSI issued funding to finance science dissemination and popularization projects. In this context, we intend to discuss how these public policies have been elaborated and to analyze the way they relate to social inclusion. In order to develop this study, we analyzed the program-funded projects and reports which were carried out in 2007 and 2008. The methodological analysis adopted was based on the documentary analysis of the projects and their subsequent ones were compared with a proposal of documents of convocation of the fund, mainly with respect to the concept of social inclusion and how the projects promoted the social inclusion. We analyzed one hundred projects and their respective final reports. For the initial analysis of the available documents, the following project characteristics were observed: project objective, target public, public participation, actions aimed at social minorities, accessibility, evaluations contained in the final reports. From the analysis of these elements, it was possible to list the main attributes that symbolize an approximation between science communication and social inclusion: consideration of the heterogeneity of target audiences and promotion of social participation strategies. The construction of the attributes will enable the elaboration of public policy indicators potentially promoting social inclusion.

Alessandra Fernandes Bizerra
University of Sao Paulo, Brazil

Bianca Hipólito de Oliveira
University of Sao Paulo, Brazil

884 Individual paper

Transforming Science Communication: New models enacted by Science Ceilidh on the Isle of Lewis

Erica Mason
Science Ceilidh, University of Edinburgh, United Kingdom

How can interdisciplinary research help transform science communication practice, leading to more culturally meaningful encounters where communities can engage with global research on their own terms?

Using a case study of Science Ceilidh, a public engagement and cultural arts “intermediary” organisation in Scotland and their activities around biology, health and well-being on the Isle of Lewis, this research identifies existing types of science communication and proposes a new one: science communication that aims to create new knowledge.

By engaging Science and Technology Studies frameworks to deconstruct the forms, structures, narratives and power dynamics in science communication encounters, science communication is described as a form of cross-cultural communication between distinct groups whose institutions, norms, and values are socially shaped. The resulting understanding transforms science-society relations, implies expanded participation in research and calls for a new framework for engagement.

These new encounters are a form of ‘inventive problem making’, where what is known about the natural world is constructed through the encounter, which is initiated and facilitated by any actor. These encounters change the boundaries of disciplinary authority, preserve conflicts and happen before research is considered “complete”.

Science Ceilidh is conceived as a model for community empowerment or cultural democracy, which can explore the incentives participants have for engaging with research and smooth the separation between the institutions and “everyone else”. This positions communities as partners in the research process, neither the subject of research or the object of information delivery. The outcomes are unique and subjective to the groups that construct them. Participants in public engagement encounters must be reflexive, creative and willing- to both change and be changed- by a subjective process that produces new outcomes. We propose that only when this occurs can new kinds of public engagement be enacted, and underrepresented communities engage in global research.

Lewis Hou
Science Ceilidh, United Kingdom

1145 Individual paper

No trust, no interest: Mexican farmers' perceptions of Covid-19 and Scientists' role in society

Lourdes Mateos Espejel
Universidad Popular Autónoma del Estado de Puebla, Mexico

The state of agriculture had already been in crisis before COVID-19 due to food security and nutrition. However, the outbreak of the pandemic added challenge on primary agriculture specially in developing countries because businesses increased their capacity to manage larger inventories, moving to on-line platforms and hiring temporary staff. In the case of Mexico, the country is in eleventh place in food worldwide production. Therefore, Mexico’s biggest challenging tasks come from the measures need to contain COVID-19 in agricultural labor-force. The main objective of this article is to highlight the perceptions of Mexican farmers about Covid-19 and their views on scientists’ role in society. Based on a qualitative approach, five focus groups were conducted with 30 farmers in total. We identified Mexican farmers have been exposed to the virus without enough scientific information and critical understanding of the serious threat they are facing. Main perceived barriers to access to scientific information were lack of interest and credibility in daily TV press conferences conducted by scientists and public workers. Besides, extensive labor hours and limited access to internet were obstacles that inhibit voluntary searches of scientific information. The realization of the present work contributes to generate hypothesis about perceptions of science in the agricultural labor force and provides a starting point to generate science communication strategies to prevent COVID-19 in the agricultural sector.

José Luis Estrada Rodríguez
Benemérita Universidad Autónoma de Puebla, Mexico

Haydeé Margarita Hernández Ruíz
Universidad Popular Autónoma del Estado de Puebla, Mexico

Helga Ochoa Caceres
Tecnológico de Monterrey Campus Puebla, Mexico

971 Insight talk

Escaping the choir - STEM escape rooms as a tool for broader engagement.

Amanda Mathieson
University College Dublin, Ireland

Escape rooms are a new and widely popular form of entertainment where players are locked in a room and in groups, must solve puzzles in order to escape. We were keen to explore this format as an engagement tool and ran two rooms over 5 days at a science centre in Malta.

We believed an escape room would inspire intrinsic motivation to participate, by meeting the innate psychological needs described in self-determination theory; namely the needs for autonomy, a sense of competence and interaction with others. The game was also designed to target different kinds of science capital in order for those not normally comfortable with science to confidently engage.

Through our evaluation we found the activities to be extremely successful, drawing players with little interest in science but who were seeking fun activities to create memories with family and friends. We found that by presenting it in the form of a challenge, players are happy to approach difficult scientific content and persist in trying to understand it in order to solve puzzles. A common theme that emerged was that even players who found the puzzles difficult, left having had a rewarding experience they would be happy to repeat. We therefore believe this format has a lot of potential as a future tool for broader engagement with science.

Increasingly, science communicators seek to bridge the gap between science and the arts, embedding science within culture. Escape rooms are now a part of modern culture and we see this as an exciting opportunity to communicate science in ways that are confidence building, entertaining and provide lasting positive associations with science for underserved audiences. This talk will cover our approach for the project, our lessons learned and our ideas for the future of escape rooms as a communication medium.

Edward Duca
University of Malta, Malta

839 Individual paper

Engagement with science and art as a means of social inclusion

Ana Matias
CIMA - Universidade do Algarve, Portugal

Social inclusion in science communication is a complex issue. During the past decades, research centres, science centres, museums and other institutions invested in science communication aiming at the promotion of cultural activities to diverse audiences. Despite this investment, science communicators still face a challenge: how to reach citizens that are not interested in science? The main goal for this innovative work was to explore techniques to engage socially-vulnerable communities with science.

The “Embodying Memories” project was developed in a collaborative way between science partners (research institutes), art partners (art museum) and administrative partners (municipality), articulated via a boundary spanner. The target audience, a senior community of women, most illiterate and migrant from Sub-Saharan Africa, was involved since early stages, starting with the topic choice - Memory.

The project implementation consisted of eight sessions over two months in 2018, covering several themes related to memory/brain. Diverse formats were used: from informal scientific presentations in neuroscience (standard in science communication), study cases storytelling (standard engagement technique), community memories sharing (aligned with current dialogue paradigm of science communication), to more interactive activities stimulating body movement, abstraction and self-expression (techniques from engagement with art). Besides in-door sessions, visits to the museum (visual art oriented) and to laboratories (neuroscience oriented) were organized, and a public presentation (empowerment oriented) was performed.

The project was qualitatively evaluated right after implementation, revealing some to moderate changes in awareness and knowledge and in engagement, high changes in attitude and moderate to high changes in social inclusion. Our analysis was based on field notes, attendance record, pre/post focus group, community evaluation and narrative, and public presentation content.

We will present how this project was structured and its outcomes, reflecting on the dynamic equilibrium between science and art education, cultural entertainment and mental health promotion necessary to potentiate social inclusion of this community.

Paulo Nuno Vicente
iNOVA Media Lab, Universidade NOVA de Lisboa, Portugal

Andreia Dias
Museu Calouste Gulbenkian, Portugal

Ana Lúcia Mena
Instituto Gulbenkian de Ciàªncia, Portugal

555 Insight talk

South African factors that shape transformation of science-society relations: A case study on how to democratise and transform science communication through the use of diverse indigenous languages in the media.

Zamuxolo Matiwana
South African Agency for Science and Technology Advancement , South Africa

As one of the cornerstone institutions in most democratic countries most citizens consume the media in order to be informed about what is happening locally and worldwide. More particularly, for most educated citizens, the media becomes is an accessible source of information about science and technology.

In this regard, science journalism and science communication play a crucial role in informing and educating citizenry about scientific advancements and allowing them to make informed decisions.

In South Africa, the mainstream media, especially print media, is mostly dominated by English and Afrikaans-speaking media houses. Few communicate in indigenous languages, thus marginalising and disenfranchising a large proportion of the population. This is more prominent in most developing countries like South Africa where there is a pervasive lack of science coverage, with burgeoning community media outlets and of the biggest public broadcaster, the South African Broadcasting Corporation (SABC) providing content predominantly focused on entertainment, sport, religion and politics.

This paper will analyse the South African Agency for Science and Technology Advancement's (SAASTA) Science and Technology Journalism Internship Programme that aims to encourage the community media to cover science and technology in indigenous languages. In particular, the paper seeks to explore community media science coverage in indigenous languages and how it contributes to democratise science communication. As such, this paper With a special focus on the medium of radio, the paper will show how radio contributes toward a dialogue model which helps to democratise the media space as well as contribute to science journalism and the science communication body of knowledge.

Radio is an important media in developing countries like South Africa, due to a high rate of illiteracy. Especially community radio stations that broadcast in indigenous languages, they improve access into information.

KEY WORDS:

Community Media, Democratisation of science, Indigenous languages, Radio, Science Communication and Science Journalism.

949 Visual presentation

Engaging with media; A Kenyan perspective

Cynthia Mauncho
KEMRI-Wellcome Trust Research Programme, Kenya

KEMRI-Wellcome Trust Research Programme (KWTRP) engages with the public with the aim of building mutual understanding, trust and respect between researchers and the public. One of the approaches is through Media engagement. KWTRP has traditionally focused on dissemination of research and capacity building for researchers. Conversely, Africa has experienced poor research reporting, due to lack of journalist skills, compounded by poor researcher and journalist relations, leading to mutual fear and suspicion. KWTRP sought to create a platform for in-depth conversations and engagement between researchers and journalists, considering the key role media plays in agenda setting, opinion shaping, advocacy for evidence-based decision in health policy, and achievement of scientific growth.

Two initiatives aimed at enriching researcher and journalist relationships were employed; the 1st, was a workshop model for cross learning between researchers and science reporters. This brought together 25 journalists, science bloggers, 30 senior researchers in KWTRP, the Media council of Kenya and the Science communication teams. Using informal structures to encourage dialogue, the program included; - Topical presentations on the work environments for the researcher and the journalist, the media regulatory framework in Kenya, a soapbox session for experience sharing, and a panel discussion that triggered a conversation on ethics for both professions and challenges faced by researchers in creating appropriate messages.

Subsequently, both teams agreed to an extensive media tour, bringing together 20 regional reporters and over 30 researchers at different levels of their careers. This included a tour of KWTRP, group discussions on ongoing research and subsequent practical skills training from the journalists on framing messages for the media.

The activities have helped in better relations between the journalists and researchers resulting in comprehensive media articles, researchers proactively seeking to work with media colleagues and journalists working with KWTRP researchers to improve their reporting, while being open to criticism.

Roselyne Namayi
KEMRI-Wellcome Trust Research Programme, Kenya

Noni Mumba
KEMRI-Wellcome Trust Research Programme, Kenya

Irene Jao
KEMRI-Wellcome Trust Research Programme, Kenya

Dorcas Kamuya
KEMRI-Wellcome Trust Research Programme, Kenya

808 Insight talk

Combining poetry and science to walk through geological time

Fergus McAuliffe
iCRAG, University College Dublin, Ireland

The notion of geological time is one the many members of the public struggle with given its immense size and scale. To this end, iCRAG (the Irish Centre for Research in Applied Geosciences) has been running a geoscience-poetry public engagement programme to explore how poetry can be used to create greater understanding of geological time and geological formations. In this insight talk we present an overview of these activities, and an evaluation of their efficacy at engaging various publics with geological time and the geosciences. Our "Poetry and Palaeontology" event at the National Museum of Ireland, run in collaboration with Poetry examined the scientific learnings that can be gleaned from the poetry of Nobel Laureate Seamus Heaney, in particular his poems that described bog bodies and the passage of time, such as "Kinship" and "Bog Queen". This has led to an ongoing collaboration with “Feile na Bealtaine”, a local arts and music festival in the west of Ireland. Events run at this festival have examined the poetry of Hughes, Auden, Yeats, Heaney and Micheál Fanning by way of a geology-poetry cliff walks. Landscape poetry, such as "The Peninsula" by Heaney, "The Song of Wandering Aengus" by WB Yeats and "Crow and the Sea" by Ted Hughes can be an excellent means to engage publics with science through the imagery of the land, and the sense of time passing by, that are created in these poems. In this insight talk we will present our thoughts on poetry-science collaboration for science communication, the results of the evaluation, and recommendations for others interested in exploring poetry to communicate geological time.

Anthea Lacchia
iCRAG, University College Dublin, Ireland

In the spirit of Mr Wizard: tracing the evolution of celebrity science through time and technology

Judith McIntosh White
University of New Mexico, United States

Arguably, the idea of the intellectual celebrity may be as old as written history – witness Aristotle's regard within the empire of Alexander the Great. However, the ubiquity of today's interactive media has made celebrities out of a growing number of scientists and media presenters, as documented by sources such as the American Association for the Advancement of Science.

The dictionary defines a celebrity quite simply as "a famous person". Celebrity scientists, therefore, are persons who become famous because of their science, whether through self-promotion or recognition by certain publics. Media science celebrities may have science qualifications but enter into the public sphere through their media presence. Our session will consider the evolution of such celebrities over time as technology has changed, focusing on both celebrity scientists and media science celebrities. Many current media science celebrities (including Bill Nye) have mentioned Mr. Wizard (Donald Herbert, whose U.S. television program, broadcast from 1951-1965, combined science experiments with encouraging children to pursue their education) as contributing to their decision to pursue science education and media work.

Our papers will discuss case studies of four celebrity scientists/media science celebrities from different countries and time periods, using the lens of Habermas' theories about the public sphere and communicative action; entertainment education methodologies and rubrics; and mass communication theories. Participants will use these tools to explore the effect of these celebrities' backgrounds and disciplinary orientations on their research foci and the content of their outreach presentations. Additionally, we will examine how intellectual climate and normative constraints and communication technologies/media of these science celebrities' times impacted their interactions with different public spheres. Finally, our discussion will compare and contrast the science celebrities chosen in an attempt to draw some lessons about the societal role of science celebrities in engaging the public in science issues.

A Case Study in 19th Century â€œCelebrity Scienceâ€: Humphry Davy and the Coal Miners of the World

Jeffrey White
TextPerts, United States

With the evolution of societal institutions from the Middle Ages through the age of mercantilism, dialectical historical materialism arose in part to explain the dialectic between societyâ€™s problems and their solutions. The same period that saw the rise of the bourgeois public sphere described by Habermas also witnessed the rise of the celebrity scientist, whose existence promised to contribute to resolution of this dialectic, turning problems into prosperity for the new class. Humphry Davy typifies the emergent â€œcelebrityâ€ scientists, presenting his papers to the intelligentsia of the Royal Institution at the same time he gave away his solution of the problem of fire damp (methane) in Britainâ€™s coal mines. Employing the theoretical framework developed in Paper #1, this paper provides a case study of Davyâ€™s work on the minersâ€™ lamp during the second decade of the 19th century. The author will highlight the effects of Davyâ€™s written papers and his lectures on the private and public spheres of the time, as Davy engaged not only his fellow scientists, but disparate strata of society including the royals, aristocrats, clergy, university professors, physicians, lawyers, industrialists, and coal miners themselves. **Bill Nye the Science Guy: Why, Oh Why?**

David Weiss
University of New Mexico, United States

In The Image: A Guide to Pseudo-Events in America (1961), historian Daniel Boorstin offers a scathing critique of the notion of celebrity, the individuals we call â€œcelebrities,â€ and their hold on the general public. Central to Boorstinâ€™s analysis is its distinction between heroes and mere celebrities: While a hero is admired for his or her courage, nobility, or exploits, a celebrity is a â€œperson who is known for his [or her] well-knownness.â€ Further, the celebrity is in large part a construction of the media and the audience; as Boorstin observes, â€œwe can make a celebrity, but we can never make a hero.â€ Perhaps no one in the science world embodiesâ€”while simultaneously challengingâ€”Boorstinâ€™s notion of the celebrity better than Bill Nye. Originally a Boeing mechanical engineer and

stand-up comic, Nye has for the last three decades popularized a variety of STEM fieldsâ€”and himselfâ€”thanks to his telegenic personality and its embrace by fans and the entertainment industry. At the same time, Nyeâ€™s celebrity status has given him a platform to work as a climate-change awareness advocate, author, and scientific advisor. Inspired by Boorstin, in my paper I explore the career(s) and creation of the person/media construct, or hero/celebrity, that is â€œBill Nye the Science Guy.â€ **New Media Science Communication in Latin America: Aldo Bartra, The YouTube Science Content Creator and his channel â€œPlatoâ€™s Robotâ€**

Denisse Vasquez-Guevara
University of Cuenca, Ecuador

Social Media is revolutionizing how science communication can engage vast audiences of non-experts with scientific content in the XXI century. In Latin America, there are still multiple barriers that still represent multiple challenges for science communication. Some of the main constraints affect the access and availability of scientific content for broad audiences. These constraints are the few available spaces for science in mass media, and the institutional barriers for developing science communication, such as (a) the scarce of funding/grants for science communication initiatives and research, (b) the lack of training for researchers and communication practitioners about science communication. Nonetheless, social media has opened new opportunities to communicate research to science-enthusiasts of all ages. This paper will address the case of Aldo Bartra, a Peruvian communication practitioner, who is the creator of the YouTube communication channel â€œEl Robot de PlatÃ³n,â€ PlatoÂ´s Robot. Only with five years, his on-line community reached 1.6 million subscribers from different countries. The content of his channel provides a variety of scientific content that varies from astrophysics, space exploration, health studies, and the demystification of fake online-information. His content is built by contrasting the findings of several scientific studies. This paper will analyze the case study of Bartraâ€™s work through the theoretical framework proposed in Paper #1 and will argue about how his contribution to science communication in Latin America has contributed to overcome some of the persistent issues of science communication for the public engagement.

743 Insight talk

Visible or vulnerable? An exploration of the impacts of - and on - role models

Merryn McKinnon
Australian National University, Australia, Australia

What does a scientist look like? The well documented stereotypical answer to that question is under renewed focus. In recent years many countries have shown considerable attention to equity in science, technology, engineering and mathematics (STEM). This has seen the emergence of more engagement and development programs drawing upon the use of role models. Arguably this has correspondingly enhanced the potential contribution of science communication and science communicators in transforming the 'face' of STEM. The perceived positive influence of role models on women in STEM is the rationale for many initiatives which aim to support the attraction, retention and progression of girls and women in STEM studies and careers. However, recent research suggests making women more visible may also trigger the same stereotypes these role models are meant to address, resulting in making the role models more vulnerable. This presentation will describe the stereotypes that are attributed to women who speak publicly about their work and the potential implications for science communication.

Christine O'Connell
Stony Brook University New York; Riley's Way Foundation, United States

685 Insight talk

Professionalising Sci Comm Professionals

Laura McLister
Edinburgh Science, United Kingdom

Whether you call it science communication, public engagement in STEM or science engagement, we all belong to a community of professionals trying to communicate or connect people to STEM topics or messages. Although at our core we are all in the same business, as an industry (in the UK) there is very little in the way of structured continual professional development. For some this results in a lack of core skills not only required for delivering public engagement but also in how to strategise communication. There are of course examples of excellent science communication but often as an industry we are working on these in isolation. In fact, in a study conducted in 20171, it was found not only is the provision of professional development very low, but maybe not surprisingly, as a sector there is very little agreement in what quality practice in science communication looks like.

Here at Edinburgh Science we believe that it is time for transformation. In 2018 Edinburgh Science was awarded as part of PLACE (Platforms for Creative Excellence Programme) funding to establish a professional development framework for the Scottish science engagement community and its creative and artistic partners.

I would like to explore the process that we, Edinburgh Science — as an organisation at the heart of this diverse sector, have been taking a holistic approach to create this framework as well as present the framework as it currently stands. The talk would examine what areas we have had to explore and define, what questions and issues it has raised, as well as the framework and how this is feeding into plans to create a professional training academy for both development and delivery of science engagement activities.

1 Featherstone, Dillon, Johnson & Manners (2018) ‘Scoping the Professionalisation of Public Engagement with STEM’

554 Individual paper

Populism towards science: What it is and how it can be measured

Niels G. Mede
University of Zurich, Switzerland

Populism, which perceives society as a fundamental struggle between an allegedly virtuous people and allegedly corrupt elites, is on the rise in many countries. Its anti-elitist sentiment often targets politicians, but also other members of the societal establishment—such as scientists and experts. Prominent examples are Donald Trump suggesting his “natural instinct” to be superior to scientific evidence and Michael Gove claiming that the British people “have had enough of experts”. We understand such ideas as science-related populism.

But so far, there is neither a theoretical conceptualization nor a survey measure for science-related populism. In our paper, we present both: First, we conceptualize science-related populism as the idea that society is pervaded by a conflict between a virtuous people and an immoral academic elite. According to science-related populism, this conflict is due to the academic elite ignoring the common will and common sense of the people when deciding on research agendas, aims, and methods and when determining what can be considered ‘true knowledge’. Second, we present a survey instrument to measure people’s endorsement of science-related populism, i.e., people’s science-related populist attitudes. To develop the scale, we tested 17 survey items in two representative surveys. Then, we used factor analysis and Item Response Theory to find those 8 items that are most indicative of science-related populist attitudes, perform best in three different languages (German, French, Italian) – and can thus be combined to a reliable scale: the SciPop scale.

Our paper offers a double contribution: First, the conceptualization of science-related populism can be used to describe how science-society relations are currently transforming against the backdrop of publics that increasingly endorse ‘alternative truths’ and criticize epistemic authorities. Second, the SciPop scale allows for empirical insights into such transformations – insights valuable for both science communication researchers and practitioners.

Mike S. Schäfer
University of Zurich, Switzerland

Tobias Fuchslin
University of Zurich, Switzerland

835 Visual presentation

Quantum Empowerment: how can we organise evidence-based science communication for a dialogue on quantum science and technology?

Aletta Meinsma
Leiden University, Netherlands

What if science fiction entangles with daily live? What if a societally disruptive technology is based on counter-intuitive science? There is a gap between science and society, maintained by mystique narratives. Especially in the field of quantum science and technology, it is high time to develop a framework to openly discuss breakthroughs and applications, to demystify such enigmatic science for the larger audience.

Since a decade, quantum science does no longer only excist fundamental research that is done in dark basements of university buildings. Recently, world-wide joint efforts focus on the technological opportunities of quantum science. This new emerging technology does not pass society unnoticed. Media are fond of this exciting and spooky technology. Recently, the race on ‘quantum supremacy’ was kicked-off by Google, covering the headlines of most mainstream media.

Evidence-based public engagement and research on the impact of quantum technology on society is highly relevant. By organizing, evaluating and improving well-thought outreach on quantum technology the societal relevance will be understood. Furthermore, it will help us to understand the bigger picture of the role of science communication in the societal acceptance and concerns towards fundamental science and new technology.

In this visual presentation I will present my ideas on public dialogue around quantum science and technology. I will reflect on previous fundamental scientific research that has had an impact on society, and I will discuss if and how we can organise robust outreach on quantum science and technology. The presentation is intended as a start for further discussion on the topic.

Julia Cramer
Leiden University, Netherlands

996 Individual paper

Exploring trends and themes of science communication using probabilistic topic modelling: Four decades of Science Communication

Rikki Lee Mendiola
University of the Philippines, Philippines

Several studies in the past have attempted to reflect on how theory and practice of science communication (scicom) as a field had progressed through the years. Scicom's intellectual progression is usually discussed: vis-a-vis the conceptual advancements of communication discipline (Trench, 2008); and in parallel with the dominant technology of the times (Kurath & Gisler, 2009). The advancement of scicom is commonly investigated through content analysis (Bauer & Howard, 2013), case studies (Brossard & Lewenstein, 2010), and bibliometric study (Suerdem et al., 2013).

We propose an exploration of a novel method""probabilistic topic modelling""to generate latent thematic structure on a given corpus (Blei, 2012). We are using data science toolkits (implemented using Python) in exploring the collection of abstracts of peer-reviewed articles in the journal Science Communication from 1979 to 2019: data collection and pre-processing, exploratory data analysis (i.e., term frequency and inverse document frequency), and unsupervised machine learning model i.e. Latent Dirichlet allocation (LDA) for topic modelling. Furthermore, emerging topics from the ML model will be explored further using word embeddings to examine semantic similarity.

The proposed paper mainly argues that the computational approach to content analysis employed is useful in exploring a large corpus of data""establishing a macroview of science communication through the years. First, the existing knowledge claims on the progression of scicom as a field can be validated. Second, emerging themes for scholarly debate can be identified. Using inductive approach with quantitative measurements in studying text (Maier et al., 2018), this proposed paper aims to establish the potential of examining text using machine learning in natural language processing.

There are 1331 articles analyzed in total. Initial EDA results can be viewed here. The study is currently implementing unsupervised ML, word embeddings, and the evaluation of the model for its realiability as part of the results in the final paper.

Garry Jay Montemayor
University of the Philippines, Philippines

634 Visual presentation

How does the public build their opinions and beliefs related to scientific issues?

Isabel Mendoza-Poudereux
Universidad de Valencia, Spain, Spain

According to the existing data, the scientific consensus should drive science-related policies. However, some controversial topics (GMOs, climate change, vaccines, CAMs, etc.) have shown us that is not always the case. Public opinion may also be a driven force and even the main one to contribute to the development of public policies. Understanding how the (sometimes significant) gap between scientific consensus and popular beliefs is generated could help minimise said controversies and ease the development of science-related programs.

The CONCISE project (Communication role on perception and beliefs of EU Citizens about Science) is working to shed light on this matter by holding five citizen consultations with 500 people, in five different EU countries: Italy, Poland, Portugal, Slovakia and Spain.

Through these consultations, researchers aimed at gaining a more in-depth insight into the public understanding of science and identify current science communication models that will reveal indicators that might help improve science communication. Similarly, the project will allow understanding how individuals perceive science communication, make decisions on relevant topics (ex, vaccines), and which information channels and sources are their preferred ones to access science information.

The analysis of all the data obtained will allow us to produce, among other results, six policy briefs addressed to help policy-makers overcome the gap between scientific consensus and popular beliefs.

The visual presentation will describe the methodology developed for the project and share the first CONCISE results.

The CONCISE project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 824537.

Carolina Moreno-Castro
Universidad de Valencia, Spain

Lorena Cano-Orón
Universidad de Valencia, Spain

Empar Vengut-Climent
Universidad de Valencia, Spain

873 Visual presentation

Presenting the Global Plant Council. Bringing plant science closer to society by helping plant scientists increase the impact of their research

Isabel Mendoza-Poudereux
Universidad de Valencia, Spain, Spain

Plant sciences have a key role to play as society seeks to address a growing suite of environmental and social challenges, from food security to mental health and conservation. The Global Plant Council (GPC) is a vibrant community of plant scientists that provides a platform for networking and collaboration. Currently, it assembles 30 member organizations across the globe, representing over 50,000 plant specialists. The aim of the GPC is to promote plant science across borders, supporting those directly involved in research, but also in education and training, while increasing awareness of the key role of plant research in both science and society.

By acting as a central plant science hub, the GPC aims to enhance and develop coordination and communication mechanisms among GPC Member Organizations and their stakeholders. In order to do this, we have rolled out a new social media and communication strategy to engage with different audiences. Currently (December 2020) our online presence reaches over 24.000 followers through its website and social media accounts.

To nurture up and coming plant scientists, GPC recently established an Early Career Researcher (ECR) International Network, the ECRi, a collection of activities addressed to help the plant science ECRs with 4 essential components of their jobs: future job hunting, grant funding, dissemination of research results and networking. In its first year of existence, the ECRi Facebook group has gathered over 3.500 members. Besides Facebook, GPC is employing other social media strategies, such as a monthly Twitterstorm of job ads and a LinkedIn group.

In our visual presentation we will give insight into our online strategy, and how this has enabled us to grow from 9.500 to 24.000 followers in 26 months and how this new reach is helping us to implement our general and ECRi objectives and continue to grow into the future.

Barry Pogson
Australian National University, Australia

Bill Davies
Lancaster University, United Kingdom

Ros Gleadow
Monash University, Australia

725 Insight talk

A balancing act: Transforming science communication through research-practitioner partnerships.

Jamie Menzies
University of Edinburgh, United Kingdom

Have you ever noticed how you use your hands to explain science ideas? Science communicators naturally use gestures to accompany speech because when we think we draw upon body-based experiences. In other words, thinking is embodied.

Hands-on exhibits create an important foundation for understanding complex science concepts, enabling learning through different forms of interaction e.g. physical actions, speech, gesture. Yet, exploring how best to support preschool visitors (whose language skills are still developing) in these body-based experiences to promote science understanding is poorly understood.

University researchers and science centre practitioners worked together to co-develop an interactive exhibit for preschoolers, encouraging them to explore and communicate their scientific thinking using actions, speech and gesture. In doing so, we created guidelines for exhibit design and science communication at exhibits. Using a design-based research method, the team analysed preschoolers' experiences with a balance exhibit to co-create a new body-based learning exhibit incorporating digital technology, communication, and hands-on apparatus.

Our approach required researchers and practitioners to alternate roles: building science centres' independent research capacity and University researchers' appreciation of the complexity of real-world settings. Exploring interactions between adults and children revealed that emphasising body-based communication improves children's understanding of balance concepts beyond expected curricular levels, with certain movements and gestures proving particularly helpful. This demonstrates how science communicators can use a range of evidence-based communication approaches to support children's learning with exhibits, increasing engagement and making science more accessible for underserved communities (low science capital) who may be less confident with using scientific language, but more confident using actions/gestures to support children's interactions.

By linking embodied learning theory and practice we produced a set of practical guidelines highlighting how to improve science communication and evaluation, serving as a best-practice model for researcher-practitioner collaboration and impactful exhibit co-design to enable embodied learning experiences.

Zayba Ghazali-Mohammed
University of Edinburgh, United Kingdom

Susan Meikleham
Glasgow Science Centre, United Kingdom

Sharon Macnab
Glasgow Science Centre, United Kingdom

Andrew Manches
University of Edinburgh, United Kingdom

836 Insight talk

Between science engagement and co-construction : the pros and cons of a natural marriage.

Matteo Merzagora
TRACES - ESPGG, France

Through a series of relevant examples collected within the action research H2020 project “SiSCode”(www.siscodeproject.eu) I will explore the points of contact and the points of divergence between science engagement activities, and emergent co-construction and participation practices.

In recent year we have observed an increasing interest of the science engagement community for the world of participation and co-construction, and vice-versa. More and more science centers are integrating fab-lab spaces and living lab approaches in their offer; citizen science activities are increasingly merging with science engagement activities; hybrid cultural spaces are multiplying, working in the grey zone between knowledge production and knowledge sharing; discussion games are often used to explore or even influence policy making around controversial socio-technical issues; design thinking is becoming an expertise valued to develop science communication actions.

This is a wonderful opportunity of renewal for science communication practices to move beyond the dialogue model. However, co-construction activities and science culture/engagement activities do not necessarily share the same objectives, neither the same business model. Also, this marriage could be influenced by fashion effects, masking differences and blurring the clarity of the political value of the activities.

The EU funded project SIS-CODE (co-ordinated by Politecnico of Milan) is exploring co-construction activities from many different angles, with a specific focus on social innovation and RRI, involving several key actors, and more specifically the EU networks of science centre and museum (ECSITE) and of living-lab (ENOLL), and the international networks of FabLabs. The experiences emerging from 10 co-design labs across Europe are currently being analyzed. In the PCST session, I will present and submit to open discussion specific results on how co-construction and science engagement activities can in fact nourish each other without loosing their specific identity and agenda, and explicit and identify the main critical factors that can promote or hinder this convergence.

Aude Ghilbert
TRACES, France

889 Visual presentation

A new nexus model for science communication

Jennifer Metcalfe
Econnect Communication , Australia

My PhD research compared the dominant science communication models (deficit, dialogue, participation) with case studies of practice. I found that the models proposed by scholars do not appear to take into account the extensive nature and mix of objectives for initiating or participating in science communication activities.

Most science engagement activities have objectives and characteristics that reflect a mix of those theorised for deficit, dialogue and sometimes participatory activities. My research indicates that this coexistence of models in practice appears to be not merely an unintentional lucky accident but a necessity for science communication activities to achieve their desired outcomes, especially when the science is controversial.

My research indicates that science communication is not an evolution from deficit to dialogue to participation (or from evil to good). In fact, it appears that long-term participatory science communication can lead to more effective deficit and dialogue-style communication.

Furthermore, I found that the nature of the relationships between the actors involved in a science engagement activity can determine the success of that activity in achieving its desired outcomes. Trusted relationships, in particular, are critical for participatory science communication activities.

My research of practice improves our understanding of how theorised science communication models might be further shaped to better reflect and even influence practice. I propose the new nexus model for science communication and describe how this can be implemented within the practical contexts of considering the objectives for engagement, who is involved in the engagement activity, and how positive relationships can be fostered among those participating.

My presentation will describe and explain the new nexus model for science communication.

598 Roundtable discussion

Participatory science communication changing publics

Jennifer Metcalfe
Econnect Communication , Australia

Participatory science communication happens when scientists are one of the groups participating on a relatively equal basis with various publics, including policymakers, citizens, school children, farmers, technologists and industry. The aim of such participatory science communication is often to address an issue or societal problem.

In the early 2000s, a new participatory model of science communication gained traction in the scholarly literature. The participatory model appealed to scholars who theorised the democratisation of science as a solution to engaging publics in jointly tackling societal issues of concern. For controversial scientific issues, like climate change, public participation was argued to be beneficial for critically reviewing research, solving problems or supporting behaviour and policy changes. However, participatory science communication can be as much about the process of diverse publics engaging with each other as the outcomes.

This Roundtable session will begin with a short overview of specific but diverse cases of participatory science communication including forensic science; participation of scientists and policymakers in supporting science communicators; livestock production groups involving multiple stakeholders; and debate on nuclear power. There will then be a moderated discussion about our various perceptions and definitions of 'participatory science communication'; what works or not with participatory science communication; how publics and scientists can be changed by the process of participation; and how scholars and practitioners can support more participatory science communication programs. The session will then be opened to questions and discussion with the audience.

Heather Doran
Leverhulme Research Centre for Forensic Science, University of Dundee, United Kingdom

Maja Horst
University of Copenhagen, Denmark

Jennifer Manyweathers
Charles Sturt University, Australia

Michiel van Oudheusden
University of Cambridge, Belgium

599 Linked papers

Participatory science communication's power to create societal change

Jennifer Metcalfe
Econnect Communication , Australia

The last two decades have seen calls by scholars for science communication to become participatory in nature, and to move away from linear (deficit and dialogue) engagement of publics. Theorised participatory science communication happens when scientists and publics directly interact in a process that scholars argue leads to a greater democratisation of science (Brossard & Lewenstein, 2010; Bubela et al., 2009; Joly & Kaufmann, 2008).

Scientists do not necessarily drive the participative process and publics may initiate and direct the engagement. This contrasts with the theorised deficit (one-way communication from scientists to public) and dialogue (two-way communication between scientists and publics) models of science communication, usually initiated by scientists (Rowe & Frewer, 2005; Bucchi, 2008).

Participatory science communication is theorised to possess an openness between participants and a deliberative democratic potential that linear models of science communication failed to deliver in practice. Achieving such a democratic potential relies on scientific governance to change its notions of power and control (Irwin, 2006; Stirling, 2008).

However, there is no joint understanding of what 'participatory' science communication means despite the push towards it by scholars, practitioners and research agencies.

This session will examine specific cases of participatory science communication that have created positive societal change. Presenters will use their case studies to discuss the comparative usefulness of participatory approaches, the constraints to participation, and the potential seriousness and reach of participation. The session will conclude with a discussion of how science communication scholars and practitioners can collaborate to promote a scientific culture where more effective participatory programs are valued and supported. **Indigenous participation in climate change communication**

Anne Leitch
Adjunct researcher, Griffith University; casual senior editor, NatureResearch, Australia

Participatory science communication is complex – and remains rare despite increasing rhetoric about its importance – because it requires a devolution of power from ‘science’ to a ‘community’. This case study outlines how adapting to climate change requires participatory models of communication, often described in the climate change literature as coâ€production of ‘demonstrably usable’ knowledge that is obtained through several rounds of interactive processes. These interactions “influence how scientists pursue science and how stakeholders understand the possibilities and limits of science” (Bremer and Miesch 2017, p2) as well as finding ways of integrating local and scientific knowledge.

This case study— undertaken with Kerrie Foxwell-Norton and Sam Mackay from Griffith University—explores these issues through our experience of working with two Indigenous local governments in far northern Australia, Yarrabah and Wujal Wujal. Our approach sought to create a dialogue about existing and forecast transformational change and in doing so, to identify resources to support climate change awareness and decision making. I outline the participatory process used to foster the cocreation of these community-specific climate change resources, leveraging the extraordinary but often undervalued capacity of these two communities to ‘walk in two worlds’: that of deep and rich cultural heritage alongside often incongruous Western institutions.

When the scientist finally comes aboard: Teacher initiated participatory citizen science

Tali Tal
Technion, Israel

Co-authors: Hilla Shefet, Nirit Lavie-Alon

Our project begins with one of the co-authors, a ninth-grade science teacher interested in citizen science, who wanted her students to take part in a local, meaningful and relevant study. Our Taking Citizen Science to School center (TCSS)

did not find such project, nor did we find a scientist ready to work with the school. However, we introduced her to an ecologist employed by the Society for Protection of Nature in Israel (NGO), who pointed to a worthwhile question to investigate: Why some plants in the local population of the rare and endangered species of Iris (*Iris atropurpurea*) fertilise and make fruits while others not? A comprehensive investigation by the students has engaged them in scientific inquiry and was followed by extensive conservation efforts that involved the community and the municipality. After few months of authentic science learning, monitoring and reporting the data in various forums, a university-based ecologist showed interest in the project. Under his guidance and permission, the students learned how to pollinate the flowers using a delicate brush to collect pollen and apply it to other flowers' stigma, and eventually - took part in removing clusters of plants from future construction and development sites to protected ones. Our study showed that: students' long-term investigation and engagement developed their interest in plant reproduction; the students' engagement and protection of a local plant population developed their agency and ownership and provided good evidence to the power of place-based education; the scientist came aboard only after some useful results accumulated but then took the lead; and we were able to show that citizen science projects offer a variety of forms of participation, which add to the participatory models our Center is offering.

Look Before You Leap: Assessing Community Readiness for Deliberative Health Action

Christy Standerfer
U of Arkansas Clinton School of Public Service, United States

Co-authors: Jason Lochmann, Louisiana Office of Public Health; Emily Loker, University of Colorado Department of Communication; Brian Wegner, Colorado Department of Community

Scholars have long extolled the virtues of dialogue and deliberation as effective methods to involve citizens in policy development. However, few have considered community readiness before demanding democratic, collective action. We argue that any type of public-facing science communication requires first assessing a community's readiness for collaboration. Further, we assert that community readiness is the product of four interdependent factors: a community's knowledge of a given subject; that subject's perceived salience within the community; the citizens' ability to work collaboratively; and the group's ability to visualize a shared future. We provide evidence for our claims in the form of survey and discursive data, collected during a two-year research project in 15 communities across a rural state in the Southern U.S. The project's objective was to determine the comparative effectiveness of three communication-based strategies for democratically addressing Type II diabetes, a pervasive public health issue. Those interventions included: 1) lecture series led by Certified Diabetes Educators; 2) facilitated community meetings; 3) deliberative forums on prioritizing diabetes and training on how to facilitate similar forums. We defined "effectiveness" as both planned and realized collective action after the interventions. Our data analysis suggested that community readiness - rather than communication methodology - was the best predictor of democratic participation. We then characterized the determinants of community readiness, ultimately creating a progressive step model to guide action-oriented science communication. Ultimately, the effectiveness of participatory approaches to science communication will depend on science communicators' ability to assess if and when to introduce such approaches. Without such an assessment, participatory approaches will at the least be ineffective and, at the worst, drive a further wedge between scientist and citizen.

Co-creating a participatory exhibition on archaeology and Caribbean heritage with 12 international partners

Tibisay Sankatsing Nava
Royal Netherlands Institute: SE Asian & Caribbean , Netherlands

Between May and July 2019, 12 local adaptations of the international exhibition 'Caribbean Ties: connected people, then and now' opened across the Caribbean and Europe. This exhibition is the result of two years of co-creation with partners from countries across the Caribbean and presents the findings of six years of interdisciplinary research on archaeology, geochemistry, network science and heritage in the Caribbean. Local partners collaborated extensively to develop a common story that is presented internationally in 6 languages, and adapted the exhibition for locally relevant narratives. To engage new participants with the topic, exhibition is presented in a variety of venues: museums, community centers and universities across the Caribbean. Participatory elements in the exhibition invite visitors to share in the interpretation and creation of meaning. These elements are also used to encourage exhibition audiences in 12 countries to contribute their ideas for future research directions. Combining these local, regional, and global perspectives, the Caribbean Ties exhibition focuses on the connections between past and present indigenous Caribbean cultures and current multi-ethnic Caribbean communities, and as such explores the living impact of indigenous

heritage. Using Caribbean Ties as a case study, this presentation examines how transdisciplinary research and collaborative exhibitions can shift the perspective from which we tell stories of scientific results and how this can contribute to decolonization practices. It also describes useful strategies to manage competing interests in a participatory science communication project, through the frameworks of co-creation and community based participatory research.

592 Roundtable discussion

"The Public Understanding of Science" - a generation on

Steve Miller
University College London, United Kingdom

It is now 35 years since the Royal Society – the UK's premier science organisation – published its report "The Public Understanding of Science". 1985 in Britain was the middle of the "Thatcher years", a time when science – particularly "blue skies" science – felt itself to be under attack. The Royal Society deemed that public ignorance of and indifference to science had to be addressed.

The report – also known as the Bodmer Report after its chair Sir Walter Bodmer – ushered in a flurry of initiatives: scientists were told they had a duty to communicate with their fellow citizens, media outlets were urged to carry more science in their pages or on the airwaves, prizes for good science communication were set up, university students and researchers were provided with courses, and Members of Parliament and Ministers were advised / lobbied on behalf of the scientific enterprise in general and individual projects in particular.

A lot of this activity was criticised as adopting a "deficit model" agenda of citizen ignorance as against more nuanced "contextual approach" involving the science people needed to live their daily lives. "Science and/in/with/etc Society" became the rallying cry.

But what has really been achieved and changed a generation on from Bodmer? Is it a case of "every attempt is a wholly new start, and a different kind of failure" (TS Eliot The Four Quartets, East Coker, 1941). And was Bodmer's influence restricted to the UK and/or the English-speaking world? This round-table will discuss "The Public Understanding of Science – a generation on" with a UK and international panel.

This Roundtable Discussion will be linked to the new PCST book, "The Emerging of Modern Science Communication".

Martin Bauer
LSE, United Kingdom

Melanie Smallman
UCL, United Kingdom

Bernard Schiele
UQAM, Canada

Luisa Massarani
House of Oswaldo Cruz, Brazil

593 Individual paper

Mauna Kea, Imiloa and a place for safe disagreement

Steve Miller
University College London, United Kingdom

The future of Mauna Kea - a mountain sacred to many native Hawai'ians - is now the site of a major demonstration / occupation in protest against the decision to allow the building of the Thirty Meter Telescope close to the summit. Although the courts have cleared the way for construction to begin, native Hawai'ian kia'i (protectors) and their supporters have blocked the access road to the mountain, claiming that the summit has been mismanaged for over 40 years since the first telescopes were erected and used there. They feel that yet another telescope adds to the "desecration" that has already been committed.

Supporters of the telescope - including many other native Hawai'ians and leaders of tradition-preserving organisations such as the Polynesian Voyaging Society - point out that astronomy is in the blood of the maka'ainana (people): spreading out from central Polynesia to the corners of the Polynesian triangle (Hawai'i, Aotearoa / New Zealand and Rapa Nui / Easter Island) would not have been possible without a deep understanding of the stars, their positions and how they moved in the night sky. They see the Mauna Kea observatory not as a sacrilege but as a natural extension of the voyaging traditions of the islands.

The 'Imiloa Astronomy Education Center - with its focus on all aspects of Mauna Kea, astronomy and voyaging - sees the mountain as a boundary object that can bring people together in a place of "safe disagreement", whatever their views. Founded in 2006, the Center runs programs and planetarium shows that emphasise what cultures have in common rather than what divides them. This talk will highlight the work done by the Center in an atmosphere of profound disagreement.

Ka'iu Kimura
'Imiloa Astronomy Education Center, Hilo, Hawai'i, United States

684 Insight talk

Changing research culture - what about the public?

Steve Miller
University College London, United Kingdom

In the "engine room" of the UK's research sector "warning lights are blinking on" (Jeremy Farrar, Director of the Wellcome Trust, 2019), despite its proven excellence and achievement. These warning lights are less to do with scientific abilities in the UK than with the overall research culture in its leading institutions. This much is clear to several of those institutions. The Royal Society - the UK's premier science organisatiion - held a landmark conference on "Research Culture: changing expectations" in 2018. It received strong input from - especially - younger researchers that a more supportive, less intimidating environment was needed for real creativity to thrive. UKRI, the body that oversees the country's research funding, has made it clear that it will sanction institutions that try to cover up bullying and harassment at the lab bench. And the Wellcome Trust, the UK's largest funder of medical research, is trying to "reimagine research" and conducting a survey run by "Shift Learning" into perceptions of the current research culture and a call for suggestions for future improvements.

These are important initiatives that demonstrate the research community's willingness to be self-reflective about the ways in which research is conducted. But as the outcomes of the Royal Society conference and the Wellcome initiative become more widely disseminated, this paper will ask what impact this self-reflection might also have in a wider context. What role might fellow citizens have in shaping research culture? Will a culture with an increased focus on diversity and inclusion be more open to wider societal influences and inputs? How might genuine public engagement be able to change the way research is done, the environment in which it is carried out, the methods that are used and the outcomes that are sought?

Gail Cardew
, United Kingdom

Richard Catlow
Royal Society, United Kingdom

1122 Visual presentation

Community Learning and Development. What's STEM got to do with it?

Konstantinos Minas
Aberdeen Science Centre, United Kingdom

Inspiring "hard to reach" communities to engage with STEM (Science, Technology, Engineering and Maths) is a challenge our team has faced since our opening in 1989. Interactive, fun and educational science engagements are a good start, but they still don't change the opinions of people that do not associate themselves with Aberdeen Science Centre, or STEM in general. Our recent partnership with the CLD (Community Learning and Development) teams of Aberdeen City and Aberdeenshire appears to be changing this trend. We started by increasing the confidence of practitioners to engage with STEM, in a way relevant to their attitudes and aspirations. By empowering practitioners, we witnessed STEM being proactively incorporated in their practice, and in turn, community interest heightened. It is only through influencing the influencers that this change was possible, and through longitudinal evaluations, we now see evidence of science spreading in Aberdeen City and Shire and inspiring communities. These observations were only made possible by collaborative working, and the lessons learnt now shape STEM delivery in our local area. Together, we have facilitated a change where community leaders are empowered to implement science learning in their practice, in a way that makes it relevant, interesting, and ultimately fun for their learners. It is only through meaningful engagements with STEM that we make the best personal choices and become greener, smarter, more responsible citizens. Aberdeen Science Centre's team in turn, is now better equipped to engage local communities in learning, and to bring about positive change to people and communities. The lessons learnt from this collaboration were many, and we are now looking into the future and all the positive changes that this collaboration can bring in our local area and in the sector of science communication as a whole.

Sue Briggs
Community Learning and Development, Aberdeenshire Council, United Kingdom

Avril Morrison
Community Learning and Development, Aberdeenshire Council, United Kingdom

Linda Clark
Aberdeen City Council, United Kingdom

Craig Singer
Aberdeen City Council, United Kingdom

1045 Visual presentation

Exploring Science where it is made: an open air and digital museum in a Brazilian university

Tárcio Minto Fabricio
Center for the Development of Functional Materials (CDMF) / Open Laboratory for Interactivity in S&T Public Communication (LAbI) / SÃ£o Carlos Federal University (UFSCar), Brazil

The open air and concomitantly digital museum “Caminhos do Conhecimento” (Knowledge Paths), created by the Open Laboratory for Interactivity for Science and Technology (S&T) Public Communication at the Federal University of São Carlos, São Paulo, Brazil (LAbI - UFSCar), offers different possibilities of mediation in the dialogue between scientific knowledge and diverse audiences, other than those already consolidated in traditional museums and science centers. The conception of the project is anchored in the theoretical frameworks of Educating Cities and science education with STS (Science-Technology-Society) approach.

The project proposes itineraries on science to be followed on the University Campus. These itineraries are indicated by the project signposts that, besides presenting texts by famous scientists and other intellectuals, contain QR codes that allow access to video content and exclusive texts related to the scientific areas of the places where they are. Such itineraries can also be accessed on the web at www.caminhos.ufscar.br. In addition, the project will offer guided tours, in which participants will be able to visit the University's laboratories, getting to know, together with where and how science is produced, who produces it.

The museum has two itineraries already operating. The first one, named “Epistemological Trail”, goes through 17 signposts narrating the history of the knowledge areas present at the University. The other, the “Light Trail”, goes through 6 signposts, presenting information about the nature of light aimed at children. Since its implementation, in 2015, the project has registered 2,790 spontaneous accesses through QR codes, with the largest number of accesses registered in 2019, what may be associated with increasing popularization of mobile internet access and, also, familiarity with the use of QR codes.

Mariana Rodrigues Pezzo
Open Laboratory for Interactivity in S&T Public Communication (LAbI) / Sà£o Carlos Federal University, Brazil

Adilson Jesus Aparecido de Oliveira
Physics Department / CDMF / LAbI / UFSCar, Brazil

1036 Visual presentation

Understanding Brazilian Scientists' motivation towards Public Communication of Science

Tárcio Minto Fabricio
Center for the Development of Functional Materials (CDMF) / Open Laboratory for Interactivity in S&T Public Communication (LAbI) / SÃ£o Carlos Federal University (UFSCar), Brazil

Brazilian Science has been going through a deep crisis, especially since the beginning, in January 2019, of a new federal government, whose President and Ministers systematically insult scientific evidences – as in the matters of the Amazon rainforest and climate change. That, together with successive and dramatic cuts in the Science budget, has brought the scientific community to the public arena, claiming for support and highlighting the relevance of increasing Public Communication of Science efforts. Spotting the moment as an opportunity to better understand how this community sees the goals of such efforts and how to transform this motivation into actions closer to the Public Engagement with Science and Technology model than with traditional diffusionist approaches, this paper reports a theoretical reflection and derived research directed to such comprehension and intervention objectives.

The Public Engagement model is still foreign to most of the research and practice in Public Communication of Science carried on in Brazil and, aiming to increase its presence, we've done an extensive review of the literature on the topic; therefrom, we've built a set of categories concomitantly designed as analysis tools to characterize and understand discourses and practices already underway within the country and as a framework to, considering such diagnostics, encourage and support policies and practices steered to more dialogic and democratic processes.

To experiment, improve and validate those categories, we've applied them to a sample of news and opinion texts published in the first six months of 2019, in the daily newsletter JCNotícias, clipping from various media outlets. Our analysis – of scientists' statements on Public Communication of Science and/or interaction between Science and Society – evidenced factors favoring or hindering the Public Engagement model, as well as the strength of the proposed categories.

Mariana Rodrigues Pezzo
Open Laboratory for Interactivity in S&T Public Communication (LAbI) / Sà£o Carlos Federal University, Brazil

Adilson Jesus Aparecido de Oliveira
Physics Department / CDMF / LAbI / UFSCar, Brazil

1056 Individual paper

When Scicom meets Devcom: Communicating science using the Devcom lens and what we can learn from it

Garry Jay Montemayor
University of the Philippines Los BaÃ±os, Philippines

Development communication (devcom) as a concept and formal field of study was first articulated by Nora C. Quebral in 1971 during a symposium held at the University of the Philippines Los Baños (UPLB) (Quebral, 2006). In simplest sense, devcom's aim is to look at how communication can improve human lives. To achieve that aim, devcom is guided by three different assumptions and approaches: information delivery, empowerment, and participation (Roman, 2005). Due to its strong leaning in practice than in theorizing, devcom has been applied in many contexts, resulting to different schools of devcom. Devcom Los Baños style is one of these (Manyozo, 2006).

Science communication scholarship in the Philippines started under the Devcom Los Baños in the early 1970s. The hybrid of two fields somewhat created a distinctive brand of "local" scicom that could be slightly different from "Western" scicom – one that aims to communicate the contents, products, and processes of science not just to inform but to improve human lives; is generally non-media centric; is closely related to the field of information science; acknowledges many different publics to work (and negotiate) with; and is participatory in nature.

Through historical document analysis and key informant interviews, the paper tries to articulate the devcom's brand of scicom by tracing its historical roots vis-a-vis intellectual influences that shaped (and are shaping) the field. Cases of scicom projects will be discussed to highlight how scicom is practiced using the devcom lens. Finally, a reflection about its praxis will be done to extract some lessons learned from past experiences that might have implications in scicom theorizing and practice in the future.

It addresses the "Time" conference theme as we investigate the history of scicom scholarship in Devcom, UPLB, and how it can contribute to furthering scicom practice especially in developing countries.

950 Visual presentation

Connecting science communication with evaluation: Representations and practices ranging from lay public to science centers

Carla Morais
University of Porto, Portugal

We report a study on the social representations of science communication among the audience and in science centers to understand the meanings around the field of science communication and the relations between representations and practices in science centers. A sample of 294 adult participants answered an online word association questionnaire. Prototypical and similitude analyses were conducted with IRAMUTEQ. Also, 10 participants from two Portuguese science centers (including stakeholders, staff, and visitors) were interviewed about their views and practices on science communication and its evaluation. Data were analyzed with NVivo. Results suggest that the public has a poorly structured social representation of science communication. Consisting of diversified and weakly tied ideas, science communication is represented as an important, necessary activity of sharing knowledge, via papers or conferences almost without references to the public and their role in science communication. Similarly, in science centers, science communication is mostly done by researchers, based on communicating factual information, in simple language to enhance the public's literacy. Science communication evaluation is restrained to obtaining informal feedback without systematic procedures. The science centers representations and practices suggest the prevalence of deficit and contextual models, given the emphasis on factual, although contextualized, scientific content. Representations of science communication in science centers resonate with the public's poorly structured ideas. The analysis corroborates the need to think of ways to promote audience's engagement and evaluation practices in science centers. The solution proposed by the I SEA Project, which focuses on deep-sea ecosystems, consists of moving evaluation into the center of the process of communication through a non-invasive procedure, i.e., virtual reality. Hopefully, the integration of communication and evaluation in a unique process, making it relevant for institutions and visitors, will help to promote the adoption of more dialogical models and consolidate the value of science communication within the public.

Luciano Moreira
Faculdade de Ciàªncias da Universidade do Porto, Portugal

João Paiva
Faculdade de Ciàªncias da Universidade do Porto, Portugal

Teresa Aguiar
Faculdade de Ciàªncias da Universidade do Porto, Portugal

Ana Teixeira
Faculdade de Ciàªncias da Universidade do Porto, Portugal

646 Visual presentation

Which has more influence on the Spaniard's citizens dieting: the media's information and social networks, health professionals or close experiences of relatives and friends?

Carolina Moreno-Castro
University of Valencia, Spain, Spain

Spaniard's consumption habits have been subjected to a high mutations process since approximately the 80s, coinciding with the increased emergence of great media corporations, advertising agencies, the audio-visual industry, and at this time, social networks. It has been a slow process, but continuous throughout the time, that has managed to modify the Spaniard's habits (based on a Mediterranean diet) and impact the whole population's health. The main objectives of this study are to know:

1) What do media and social networks role play in the decision to decline for one food or another?
2) Which channels do citizens to use to look for nutrition information?
2) Which are the favourites sources of information to understand information related-food?

To respond to these questions, at October 2019, ScienceFlows team has launched a questionnaire to 100 Spaniard people, population-representative; i.e. gender, age, academic training, ethnicity, impaired people, and professional career. The survey incorporated variables to know if the choice of a diet by citizen were based by the information popularised on the digital media, social networks, political, moral, religious influences, or intimate experiences from relatives and friends. Then, people from the selected sample sent the questionary to friends and relatives through WhatsApp. Finally, we have received 325 responses. We are working in the analysis of the role played by the digital media or social networks in the social construction on diet and food. This study is part of a big project (ESMODA-ECO-RTI2018-099663-B-I00), funded by the Spanish government and FEDER funds from the European Commission.

Empar Vengut-Climent
University of Valencia, Spain

Isabel Mendoza-Poudereux
Unviersity of Valencia, Spain

Lorena Cano-Orón
University of Valencia, Spain

Ana Serra-Perales
University of Valencia,

576 Insight talk

"Photograph 51": Science Communication in Contemporary Theater

Constantinos Morfakis
National and Kapodistrian University of Athens, Department of History and Philosophy of Science , Greece

In our time, the interaction between science and performing arts updates famous C.P. Snow's view of "two cultures" (1956) – which science and the arts/humanities are at "war" with each other – to a "third culture" that arts and science may actually build a harmonious relationship. According to Lustig and Shepherd-Barr (2002) "science is in vogue on stage as it has never been before. The best of these plays go far beyond using science as an ornament or a plot device".

In this paper, we consider issues about the public image of a famous women scientist in the award-winning drama of Anna Ziegler, called Photograph 51 (2015). The "bioplay" is known for its revelation of the laboratory life of x-ray crystallographer Rosalind Franklin and her often-overlooked role in the discovery of the double helix structure of DNA whilst at King's College London, where she shared a laboratory with the molecular biologist Maurice Wilkins.

Making use of actor-network theory (ANT), our given reading of Photograph 51 opens the "black box" of technoscience. In Latour's terms (2005), this drama shapes a public image of technoscience as a network of heterogeneous elements which are taking place within a set of diverse practices. In STS's terms, Photograph 51 depicts the laboratory life (Latour & Woolgar 1986) and science in action (Latour 1987) highlighting the Baconian character of modern science (Ihde 2004; Hacking, 1983). Alongside, drawn upon Gender Studies (Keller, 1987; Fliker 2003), we point how Photograph 51 shapes a feminist image of woman scientist in a male dominated scientific community. It invites us to look at the way women are treated in science today by looking at the subject through the prism of the past. In this context, Photograph 51 proves performing arts to be an advantageous medium that transforms the up-to-now way of science communication.

Yannis Hatzikiriakos
National and Kapodistrian University of Athens, Department of Communication and Mass Media, Greece

1015 Visual presentation

Breaking Good - open source drug discovery and science communication

Alice Motion
University of Sydney, Australia

The Open Source Malaria (OSM) consortium has been pioneering open source drug discovery since 2011. The aim of the project is to find a small molecule that is effective for the treatment of malaria using open science principles. All experiments are published on the Internet in electronic lab notebooks, all data are available for anyone to use and there will be no patents.

One of the many advantages of this open approach is that barriers to participation are much lower than for traditional drug discovery projects. This has enabled the development of a chemical education and citizen science project, Breaking Good, whereby undergraduates and even high school students can take part in a real research project and synthesise new drug targets.

Over the past five years, undergraduates in the USA, UK and Australia have all worked on the synthesis of novel antimalarials and some of the molecules made show promising activity against Plasmodium falciparum. Additionally, a class at a local high school have contributed to OSM and in 2016, they synthesised the price-hiked toxoplasmosis medicine, Daraprim, in their high school laboratory.

In this paper, Dr Alice Motion will describe the impact of widening participation in research to realise research for all and opening up conversations about access to medicine through the involvement of non-experts in the discovery of new medicines.

1026 Visual presentation

The Nano Lens - Art, Science, Nature

Alice Motion
University of Sydney, Australia

The Nano Lens project explores what it means to look and aims to expand visual experience. Presented in Schools and at Public Outreach events at the Royal Botanic Gardens, Sydney, the project challenges us to see things in nature anew and develop a deeper understand of the links between art and science. Both art and science celebrate and look out for the details in the world around us - a still life painting demands close study from both the artist and the viewer and science has long studied the details of nature.

This project seeks to question what it means to look? What does it mean to continue the close study of the detail in the world around us beyond what is visible to the eye or under a traditional microscope? What do techniques of microscopy like scanning electron microscope (SEM) uncover? What new structures and surfaces can be revealed in looking all the way down to the nano scale - a scale difficult to imagine of ‘one billionth of a metre’ that is full of beauty and extraordinary potential.

The Nano lens was born out of a new collaboration between nanoscience and the humanities. It is designed to help show the fascinating worlds of nanoscience and art to a wider public – moving beyond popular discussions of nanoscience which have focused on debates over the safety of nanoparticles in sunscreen or nano robots in science fiction and open up a new appreciation for art and science.

This presentation will explore the ways that art has helped members of the public to gain a greater understanding and appreciation of the nanoworld and how, in turn the nanoworld has helped to increase their understanding and appreciation of art.

Chiara O'Reilly
University of Sydney, Australia

Chiara Neto
University of Sydney, Australia

926 Insight talk

The value proposition of science engagement in the South African National System of Innovation

Lindie Muller
National Research Foundation, South Africa

INTRODUCTION FOR PRACTICE INSIGHTS

In 2015, the South African Department of Science and Innovation (DSI) appointed South African Agency for Science and Technology Advancement (SAASTA) as the national coordinator to drive science engagement and act as a catalyst between science and society. Contextually, science engagement is facilitated through three core focus areas; supporting science education in the primary, secondary, and tertiary educational institutions; facilitating dialogue with the general public to create science awareness; and enabling science communication through the training of researchers and media engagement. This is done to ultimately contribute to the STEMI value system. Each stakeholder group is developed in such a manner so that they can, in turn, also enhance the value system by feeding skills back into the NSI to replenish the value chain and assist in driving the value creation process, as well as address the governments' objectives by ingraining STEMI deeper into society.

METHODOLOGY

The presentation will highlight the manner in which the different science engagement activities, coordinated by SAASTA, connect within the National System of Innovation's (NSI) value chain by type of implementation method and audience and the extent that the value proposition is addressed. Furthermore, the presentation will indicate how each target group is engaged to generate the most value and will outline how these skills, developed through science communications, are fed back into the NSI. The presentation will end off with practice insights for science engagement in systems similar to the South African NSI.

928 Insight talk

Process technological change: Evaluating the possibility of integrating technology as a science communication method in rural South Africa

Lindie Muller
National Research Foundation, South Africa

INTRODUCTION FOR NEW IDEAS

With the wide-ranging impact of STEMI on society, science communication is fast becoming a necessity for socio-economic development. In rural South Africa, support is often required due to the limited access to resources; especially access to technology. This ultimately means that science engagement is facilitated through conventional means to provide equal opportunity for engagement in STEMI; paper-based methods that facilitate science communication or direct access to stimulate participation. Although this has proven to be a successful method, it creates constraints and reduces the ability to reach a wider audience. This is evident from the number of possible participants expressing interest, as opposed to the number of participants that STEMI projects ultimately reach. The variations are often significant. Using a flagship project of the South African Agency for Science and Technology (SAASTA), the national science engagement coordinator, as appointed by the Department of Science and Innovation, as a case study, an analysis was conducted on the process of conventional science communication distribution methods, and the likelihood for integrating technology to reach a wider audience in rural South Africa. Thus, improve on the value chain.

METHODOLOGY

The practice insight or poster will outline the analysis of the rural South African technological landscape and will propose a process adjustment through the possible integration of technology to maximise efficiency in science communication. In addition, the perceived benefits and limitations identified, including the impact on resources, as well as the viability will be recorded.

929 Visual presentation

Science in the Media: An analysis of science content distribution in South Africa

Lindie Muller
National Research Foundation, South Africa

INTRODUCTION FOR POSTER

It is said that there is a general preference by members of the public to engage mass media as a source for science learning (Burakgazi & Yildirim: 2013) and with the recoded high media engagement rates by the South African public, it is assumed that there is widespread science awareness facilitated through science communication in the media. Currently, the South African Agency for Science and Technology (SAASTA), a business unit of the National Research Foundation, tracks mainstream and rural media on behalf of the National System of Innovation (NSI) that includes a total of nine STEMI-focussed entities of the South African Department of Science and Innovation (DSI), as well as a comprehensive list of science fields not associated with any of the aforementioned entities. Although the subsequent reporting is predominantly focussed on brand awareness at this time, the content relates to engagement, advancement, and awareness of various STEMI topics.

METHODOLOGY

The poster will outline the outcome of a data analysis on science communication in South Africa's mass media sphere. It will provide an analysis and categorisation of the STEMI-content according to science streams, geographic distribution, demographic engagement, language, sentiment, and access to STEMI information by different socio-economic groups through editorial print, broadcast radio, broadcast television, and new media. In addition, it will also outline the results of a readability test on a sample to determine the level of education required to interpret the text and whether the content is thus aligned with the targeted audience.

833 Visual presentation

Magnet Theatre for Health Research: Experiences of using drama for stimulating dialogue amongst Kenyan public

Noni Mumba
KEMRI Wellcome Trust Research Programme, Kenya

Ethics guidelines recommend community consultation and involvement as important steps in enhancing interaction between researchers and host communities. Through engagement, researchers and communities can share and learn about each other's experiences and create a conducive environment in which research activities thrive and provide health benefits to all.

The KEMRI Wellcome Trust Research Programme (KWTRP) implemented pilot drama outreaches known as 'Magnet Theatre', as part of a wide range of engagement approaches, to engage publics in Kilifi with health research. Magnet Theatre (MT) has, for decades, been used as a means of stimulating debate about health behaviours that put people at risk of infection. The approach involves consecutive drama performances in a specific location over time to attract repeat audiences, whose change in attitudes and views can potentially be tracked over time.

We implemented 12 theatre outreaches in two locations, specifically targeting youth and adults. The aim was to stimulate dialogue among the public on health research. One and a half hour outreaches were conducted at the same time and venue every two weeks for a period of 6 months. The outreaches reached an approximate 1400 adults. Evaluation methods included analysis of reports, and a review workshop with 25 audience members. We found that participants enjoyed the drama, and were able to contribute to solving dilemmas potrayed. Dialogue was moderated by a trained facilitator. Audience members talked and challenged eachother on the pros and cons of research and benefits accruing from our research institution, KWTRP. Some outcomes include audience members learning about how research benefits are determined, increased understanding of the mandate of KWTRP and better understanding of research processes.

Through a short film and a PowerPoint presentation, we present how these outreaches were conducted and share findings from our monitoring and evaluation activities.

Salim Mwalukore
KEMRI Wellcome Trust Research Programme, Kenya

Hassan Alphan
KEMRI Wellcome Trust Research Programme, Kenya

Mary Mwangoma
KEMRI Wellcome Trust Research Programme, Kenya

Johnson Masha
KEMRI Wellcome Trust Research Programme,

1050 Insight talk

The Story of John Edmonstone, Darwin's Teacher

Padraig Murphy
Dublin City University, Ireland

There is little information uncovered so far about John Edmonstone. Our main source is Charles Darwin. He wrote in his Glasgow memoirs from his time as medical student about this “kind and intelligent man”, his paid teacher. Darwin learned from John how to trap, kill and stuff wild birds. And much more besides. All pivotal to Darwin’s field studies many years later in the Galapagos.

There is increasing academic interest in this freed Guyanan slave who inspired Darwin. There is a book here and this is one possible output. But historians are looking for missing pieces of the jigsaw of his life.

Could we develop a screenplay to fill in the gaps? Much of the action takes place down the road around the University of Edinburgh, where Edmonstone was employed as lecturer. The characters are there. Was the central character, John, stoic, deflecting British racial prejudice of the time, using objective reason and ordering of ornithology and botany to de-politicise, with science the Great Leveller? Darwin was then a young medical student who rebelled against the "horrors" of medical training and became inspired not just by stories of the natural world but of John's own story, igniting his reported interest in emancipation. And the most interesting of all: the woman that historical records called ‘Princess Minda’, of Guyanan royalty, wife of Edmonstone’s former master, but an independent woman residing in Glasgow. What stories had these immigrants?

The themes: the conflict of naturalists both in love with its pastoral beauty yet killing birds for scientific understanding: the human preoccupation of “taming nature;” people of colour’s exclusion from the story of science; immigrants shorn of identity, enriching a nation.

The plot writes itself. Or perhaps a few people can join my talk as we continue the story of John Edmonstone and discuss science, history and screen storytelling.

1028 Individual paper

Communicating vaccinations, cancer screening and reproductive rights: a snapshot in time during rapid political change in Ireland

Padraig Murphy
Dublin City University, Ireland

Between the years 2015-2018, Ireland went through a time of significant social transformation that brought about the legalising of same-sex marriage, the removal of the Eighth Amendment in the Irish constitution banning abortion, and also uncovering of many historical institutional abuses of women and children, for which the Irish state was complicit. Any health policy intervention requires renewed public trust.

These changes are subpolitical with risk subjectivities occurring from outside traditional science and politics (Beck, 1992; Slovic, 1987). It is also the biopolitics of Foucault, as recent STS scholars such as Rosa Braidotti or Nik Rose have explored. When applied to healthcare, there are questions of women's rights and the rhetorical use of scientific and other evidence. Wynne and Irwin, in the early days of PEST, applied risk perception theories to communicating science. However, intersectional theoretical areas of politics, educational argumentation, risk and feminist STS rarely meet in science communication discourse.

What globally can be learned from an engaged healthcare policy in this time of change in a country moving towards perceived liberalisation? What methods communicating science accurately yet inclusively apply to other countries?

This paper draws from a study of policy documents, news coverage and social media in three areas that have become major Irish political issues: the raising of awareness of HPV vaccination, the CervicalCheck scandal and access to information to abortion and other reproductive services post- 8th Amendment.

The study found the enduring power of deficit-model rhetoric. Government and advocates used conflicting communication mechanisms that demonstrate 'patient care', 'patient as bio-object', 'paternalism/misogyny' and 'state control over individual' where: 1) the state enacted biopolitical action for the health of a population; and 2) the state was accused of enacting biopolitical action against individuals or groups. Using STS approaches, the solution offers propositions of humility, bridging Wynne/Slovic, argumentation and feminist biopolitics.

964 Demonstration

A Cabaret of Dangerous Ideas: Seven years, 230 shows at the Edinburgh Festival Fringe

Fiona Murray
University of Edinburgh, United Kingdom

The Cabaret of Dangerous Ideas (CODI) is an innovative and highly successful co-produced public engagement with research programme. Started in 2013, this is a collaborative effort between the four universities in Edinburgh (coordinated through the Beltane Public Engagement Network), Fair Pley and Susan Morrison. CODI takes public engagement into the thick of the world's largest arts festival: the Edinburgh Festival Fringe. In 2019 there were 48 CODI shows at the Fringe presenting different dangerous ideas every day and providing opportunities for the audience to discuss and debate cutting edge and controversial research with experts.

The strength of CODI lies in the development time and comprehensive training programme for researchers including knowing your audience, marketing and stagecraft. The shows and training appeal to both senior academics and Fringe going audiences as they are informal yet intellectual and have the prestige of being part of the Fringe. The shows use provocative statements and humour that result in lively discussions that address the complexities of the subject areas. Audience contributions are an integral part of the show and researchers expect to be challenged.

In keeping with this year's conference themes, this demonstration will present Dangerous Ideas around Data, however the CODI format is highly versatile platform for all research areas.

This Demonstration will start with two taster CODI shows: "Dark Side of Data Security" and "Privacy is Dead, Long Live Privacy!"

We will then present the outcomes and conclusions of 7 years of evaluation data from audiences and performers.

This will be followed by a facilitated panel discussion covering:
Co-production with entertainment professionals
Training researchers in stagecraft and marketing
Researcher experiences performing at the Fringe
Questions from the audience

Stephen Wright
Fair Pley, United Kingdom

Susan Morrison
Edinburgh Festival Fringe Society, United Kingdom

Nicola Osborne
University of Edinburgh, United Kingdom

Ross Donaldson
Heriot-Watt University, United Kingdom

965 Visual presentation

Transforming relations between science communication practice and research

Roselyne Namayi
, Kenya

Jukwaa la Utafiti (Research platform): A Health Research Radio Programme at the Kenyan Coast
Noni Mumba, Cynthia Mauncho, Roselyne Namayi, Gladys Sanga, Salim Mwalukore, Irene Jao, Sassy Molyneux, Dorcas Kamuya

KEMRI Wellcome Trust Research Programme
Research at the KEMRI Wellcome Trust Research Programme (KWTRP) on the coast of Kenya is supported through a vibrant community and public engagement strategy. Engagement activities have mostly been implemented within the Kilifi Health and Demographic Surveillance area (KHDSS - an area of approximately 260,000 people), where KWTRP conducts research and census activities. Our approaches have comprised a range of face-to-face activities that are limited in reach and scale. Jukwaa la Utafiti was a radio program that was initiated as part of KWTRP's overall engagement strategy, to meaningfully engage publics within and beyond the KHDSS.

The radio program was implemented in collaboration with the Kilifi County Department of Health. The weekly 2-hour live studio show hosted two to three studio guests, comprising of KWTRP researchers and a County Health staff. Guests interacted with listeners through discussions, phone text messages and live calls.

To date, 40 scientists have participated in live studio sessions and presented close to 45 research studies. Researchers have appreciated the opportunity to dialogue with Publics about their research projects. Listeners also got an opportunity to share their views and concerns about research. While this method of engagement reaches a wide audience, estimated 50,000 people, the depth of engagement is limited compared to face-to-face interactions. This approach also requires large funding resources, including a dedicated staff to run the project. A dedicated group of listeners is also important to measure listenership of the programme.

Approaches that are innovative, stimulating and interactive are increasingly being embraced by researchers. We present our experiences through a short PowerPoint and a 5 minute film.

Cynthia Mauncho
, Kenya

Noni Mumba
, Kenya

Salim Mwalukore
, Kenya

946 Individual paper

Communicating science in developing contexts: the Philippine perspective

Kamila Navarro
Formerly De La Salle University , Philippines

Since the establishment of science communication as an academic discipline, much of the literature produced has come from developed, typically Western, English-speaking countries with prominent scientific cultures. The Western dominance of science communication research was tackled by Guenther and Joubert in their 2017 bibliographic survey of articles published in three major science communication journals. Almost 70% of the surveyed articles originated from just five countries – the USA, UK, Canada, the Netherlands, and Australia. Although studies from these countries offer interesting insights into best practices in science communication, their findings cannot always be generalized to developing countries with vastly different worldviews and socioeconomic milieus.

It is crucial to also highlight science communication experiences from developing, non-Western environments. This particular study focuses on the present context of the Philippines, a populous Southeast Asian archipelago. Science in the Philippines has historically been characterized by scarce funding, insufficient scientific capacity, and middling research productivity. Furthermore, with over 7,000 islands and more than 180 different languages, the Philippines offers a distinct science communication context worth further exploration.

This study therefore examined the challenges encountered by scientists and science communicators from Manila, Philippines when publicly communicating science through an online survey and semi-structured, investigative interviews. Their answers were surprisingly similar to challenges raised in other international studies – problems with the lack of time, training, opportunities, financial resources, and manpower. However, challenges regarding the accessibility of science communication efforts and the local attitudes to science were magnified due to the distinct cultural, geographical, and socioeconomic context of the Philippines. These results indicate the universality of certain challenges in science communication as well as the need for science communication frameworks that consider each country’s unique cultural context.

Kamila Isabelle Navarro
Formerly De La Salle University ,

545 Individual paper

Shifting Spaces for Digital Storytelling; The Case of CRISPR Cas-9

Pouria Nazemi
Concordia University, Canada

This paper engages with debates and the changing landscape surrounding digital storytelling, journalism, (with the focus on online videos) and controversial science and technology. As Stuart Allan argues the impacts of the digital age and digital technologies on science journalism could be both salutary and daunting (Allan, Journalism, 2011).

This is clearly seen in the popularity of social media and tendency to produce short format journalism content for the web, which may sacrifice details for brevity and has (re)awoken debates over reliable sources and the spread of pseudoscience online. To examine these debates, we take a closer look at the case of CRISPR Cas-9 technology and the journalism coverage surrounding this technology. CRISPR Cas-9 is a new and powerful gene editing tool. With this method, scientists could apply specific changes in the target DNA. This method can change the landscape of biology (Doudan et al., Science, 2014). In particular, we build on efforts to develop models of science journalism (Secko et al., Journalism Practice, 2013) and present a qualitative content analysis (QCA) of CRISPR Cas-9 stories as per the models they embody. The implications of various models are explored with reference to their accuracy and their potential for utilizing digital tools to empower different model-based stories. The role of technophobia in digital storytelling is seen to emerge as a key debate for the future.

Keywords:
Digital storytelling, science journalism, CRISPR, modelling, technophobia

552 Insight talk

Neurosciences in action: "Lets talk mom" narratives

Aquiles Negrete
UNAM, Mexico, Mexico

The program Lets talk, Mom is a science communication intervention and research investigation project addressed to low-income pregnant women from Chile, South America. This initiative seeks to communicate neuroscientific knowledge (brain stimulation and development, as well as neuroprotection, language development and stimulation, toxic stress, neuroplasticity, etc.) to future mothers, from early stages of their pregnancy up until their infants reach four years of age. By conveying this scientific information to mothers and to their children, we expect to contribute to breaking cognitive barriers of inequality and promoting social transformation and inclusion.

Lets talk, Mom is the first program of its kind, operating a new, comprehensive methodology which uses language as the main catalyst for prevention of the psychological stresses of living in a chaotic environment, the lack of linguistic stimulation and the possible psychological damage of being born into poverty.

The results of this research suggests that there was a positive impact in the pregnant mothers and their infants that participated in Let’s talk, Mom program, providing them with concrete self-care strategies, increasing welfare levels and diminishing stress and anxiety. Also the results suggests that providing the mothers with neuroscientific knowledge and some guidelines to rise their children, neuroprotection and language stimulation of their children was fostered.

In this paper we propose that using narratives, in conjunction with other ludic and experiential activities is one possible way to communicate neuroscience in an understandable, reliable and enjoyable way to audiences with low literacy and low income levels in Latin America.

Analía Silberman
Conversemos Mama, Chile

893 Individual paper

Sustainability on Display: the opportunity to transform our visions about nature through science exhibitions

Ana Nepote
UNAM, Mexico

One of the greatest challenges for the 21st century is the transition towards more sustainable models of life and human-nature relationships. The 2030 United Nations Agenda for sustainable development raises a series of commitments that involve, governments, universities, and diverse social sectors. Among the 17 objectives included in the agenda, there is one related to sustainable development, production and responsible consumption (SDG12). Latin American countries have been centers of origin and improvement of crops such as corn, cocoa, beans, pumpkins, and medicinal plants. The local knowledge, experiences and community management of the land are practices providing sound and alternative referents towards sustainable transformation. In this proposal, two temporary exhibitions developed by the National Autonomous University of Mexico (UNAM) related to this topic are analyzed. The UNAM, one of the largest in Latin America, has 27 university museums. Between November 2018 and April 2019 the Science Museum, Universum, hosted a temporary exhibition about sustainable food production and practices that favor biodiversity conservation. A second temporary exhibition was displayed at the Museo de San Idelfonso between October 2019 and February 2020. This exhibition was related to the Art of Eating Insects in Mexico as a practice of culinary and natural heritage. Both museums are located in Mexico City, a megalopolis with great challenges in sustainability. Based on a qualitative analysis of the narratives and approaches of each exhibition, the discourse related to the issues of the production and consumption of sustainable foods, the relevance of knowing the origin of food and the role that consumers have in the transformation towards more sustainable lifestyles is discussed. These cases allowed me to analyze the role such exhibitions have for environmental communication, the need for interdisciplinary and multicultural perspectives in this topic and the potential contribution museums have as spaces for planetary citizenship.

1118 Individual paper

Family from low-income experiences within a science museum

Rosicler Neves
Museum of Life Fiocruz, Brazil

There is evidence that science centers provide opportunities for families to engage with science through a variety of activities, hands-on and interactive exhibits, plays, storytelling, among others. There is a large body of research on several aspects of family experience in various types of museums. However, little research has focused on the family from low-income and minority groups in a Latin-American context. What happens when these families visit science museums? How explainers interact with these families? In order to answer these and other questions, we are carrying out a research project to understand the experience of families from disadvantaged social position in a Making and Tinkering Activity, during a visit to Museum of Life - a hands-on science museum in Rio de Janeiro. To understand the interactions from the perspectives of the families and the explainers, ethnographic and discourse analytic methods, including interviews, videotaped observations of the activity and focus groups are used. Our preliminary results indicate that visitors have special needs that demand different strategies. At PCST, we intend to present some of our results and discuss implications for explainers training programs and more inclusive informal science opportunities.

Luciana Sales
Museum of Life, Brazil

Luís Carlos Victorino
Museum of Life, Brazil

986 Individual paper

Unpacking the

Todd Newman
University of Wisconsin-Madison, United States

The purpose of using marketing techniques is grounded in one of the cornerstones of communication: “know your audience.” Yet, in our efforts as a community to better understand public engagement and communication, we have overlooked the latent associations of both scientists and the public to science.

One of the first forays into this line of research finds that when asked how respondents “feel when they hear the word science,” over 60 percent of the U.S. public responds “hope.” To follow-up on this finding from the scientists’ perspective, recent evidence from a survey sent to members of 27 professional STEM societies in fall 2018 (N=3,619) finds more mixed results: only 35% of scientists respond “hope,” while 35% respond “joy and excitement.”

The functional, symbolic, and emotional connection that both the public and scientists have to science are the building blocks for understanding the brand of science. Just as marketers carry out similar exercises to understand customers’ relationships with particular products or services, so to must science communication professionals understand these similar dynamics.

This presentation will present original evidence on how the U.S. public thinks about the brand of science, and the way in which the global scientific community can strategically think about these meanings. For example, these differences may result in two different meanings: those who see science as more “pay-off” oriented (i.e. some type of reward in the future) versus those who see science as more “process” oriented (i.e. some type of reward in the present). In this presentation I will unpack the ambiguity in these meanings, and why ultimately this evidence suggests promising directions for how the scientific community guides communication and engagement strategies with both the public and scientists.

Chris Volpe
ScienceCounts, United States

983 Individual paper

Science Communication and Criminal Justice

Niamh Nic Daeid
Leverhulme Research Centre for Forensic Science, University of Dundee, United Kingdom

There is no other place in which science and the communication of that science is so rigorously tested than within the justice system. The identification and recovery of potential evidence at a crime scene, the analysis of the recovered materials within a laboratory, the interpretation, evaluation and communication of the relevance of the laboratory results to the public who have a decision to make in regards to guilt or innocence are all chapters within the narrative of a legal procedure.

This presentation will highlight the important role of science communication and the challenges it faces in the justice setting. What do we know already and how are the challenges being addressed? How might technology play a role in transforming the communication of science in the justice system? How can we use the power of narrative to transform the presentation of science in the courtroom?

We will present our experience in how:
- Disparate groups in the justice system, from judges to forensic practitioners to members of the public can be brought together in strategic conversations to create research projects and highlight the challenges faced in understanding and communication
- Applications of virtual and augmented reality may aid but also may complicate the picture for how scientific evidence is handled within the justice system
- Involving citizen scientists in research can impact communication
- Communication tools such as comics may support the jury in understanding evidence

The Leverhulme Research Centre for Forensic Science is a £10 million, 10 year award winning disruptive research centre with the aim of increasing the robustness of scientific evidence used within the justice system and ensuring that forensic science is communicated correctly and appropriately.

Lucina Hackman
Leverhulme Research Centre for Forensic Science, United Kingdom

943 Linked papers

Time and transformations in practices and cultures of science communication

Kristian H. Nielsen
Aarhus University, Denmark

This session addresses practices and cultures of science communication, past and present. We aim to engage empirically and conceptually with the historical development of media, actors, systems and institutions of science communication up from the 19th century and up until the present day. We present papers on different regions and countries: Scandinavia, Russia, Estonia and the Netherlands. We seek to provide historical overviews and new understandings of the emergence of practices and cultures of science communication in national as well as transnational contexts. Time and place as well as different media for science communication play an important role in all presentations demonstrating how historical contexts for science communication change and thus enable transformations in the ways in which actors practice and perceive science communication. All presentations emphasize contextual factors that have shaped and continue to shape practices and cultures of science communication. The discussion will be facilitated by our chair Michelle Riedlinger of University of the Fraser Valley. The first three out of the four papers are based on chapters in Communicating Science: A Global Perspective, edited by Toss Gasgoigne et al., ANU Press, 2020 (open access, http://doi.org/10.22459/CS.2020). **Estonia, the small country that chose the educational focus**

Arko Olesk
Tallinn University, Estonia

Estonia, with just 1.3 million people, is one of the smallest countries in the world to use its own language as the primary language in all areas of social life. Today, the country also has a modern science communication landscape with science centres, science festivals, established science journalism, and a national programme to foster science communication. The leap to a modern science communication system in Estonia required several supportive factors to come together in the beginning of the 2000s. The society was recovering from the ruptures caused by the transition following the regaining of independence in 1991. The scientific community started to discuss the same set of perceived problems that helped to launch the science communication movement in Western European countries in the 1980s and 1990s: lack of students in STEM-fields (science, technology, engineering and mathematics), little or inaccurate media coverage of science, and the diminishing role of science and scientists in society. New resources became available, most importantly funds from the European Union (EU). By around 2005, the stage was ready for a quick expansion of science communication activities in Estonia. One prominent initiative was TeaMe, the national science communication programme (funded by European Social Fund). It declared as its aim to “increase the awareness of young people and the whole population about the impact that research and development and innovation have on national competitiveness and productivity and thereby on social well-being”. As a result, many of the programme’s activities focussed on science communication in the educational system: guiding the interest of young people towards choosing a career in STEM fields. A significant section of various science communication activities in Estonia is still dependent on project-based funding, including EU funding. This means that the science communication system in Estonia, while developed, is still fragile.

The Emergence of Modern Science Communication in Russia: From All-out Science Propaganda to Modest Public Engagement Initiatives

Dmitry Malkov
ITMO University, Russia

Throughout the 20th century Russia experienced dramatic reversals in terms of government support of science communication activities. The evolution of science communication in Russia has closely followed the train of political and ideological thought in the country, thus drawing a line between Russia and other world regions, which can still be discerned to the present day. During the Soviet times, science popularisation enjoyed an unprecedented scale and support fueled by the era of fast technological growth, space exploration and ideological rivalry with the United States. With the collapse of the Soviet Union, however, popular science plummeted together with science itself. The grave economic situation led to dwindling science funding and left virtually no room for any institutional support of science communication. These events left a profound mark on the public and political support of science communication and largely defined the attempts to rebuild science communication practices around the country in the 21st century. While

many Western nations were busy elaborating on novel theoretical and practical approaches to science communication, including dialogue and participatory engagement models, Russia remained isolated from this discourse until the late 2000s. Today, despite the renewed role of the state and industry in Russian science communication and a growing number of bottom-up initiatives, there remains a large theoretical gap required to describe, understand and promote effective policies that can address unique challenges posed by the modern science communication in Russia. Co-author: Alexandra Borissova, ITMO University

The meaning of public-private partnerships for science communication research and practice

Fred P. Balvert
Erasmus University Medical Centre, Netherlands

Current approaches of science communication promote the engagement of all societal stakeholders in research. These include private companies that pursue economic profit. The role of companies in research is problematic from the perspective of science communication for two reasons. Firstly, private enterprises do not fit into the discourse of science communication that has developed since the second half of the twentieth century. Secondly, the role of commercial partners in research is considered as controversial in the public debate and the media. In order to stay relevant, science communicators have to develop useful modes of dealing with industrial partners in science communication theory as well as in practice. With examples drawn from the Netherlands, this paper explains the relation between research and industry from a historical science communication perspective by making a distinction between the values of curiosity-driven research, societal relevance and market economic principles. It points out the roles and responsibilities of the stakeholders involved: researchers, research institutes, science communicators, journalists and companies. It concludes with a schematic division of the modes of science communication practice.

1011 Visual presentation

Towards a more inclusive science communication in museums: a case study of Brazilians with visual disabilities

Jessica Norberto Rocha
Cecierj Foundation, Brazilian National Inst. of Communication of Science and Technology, Brazil

Access to science and its communication by people with disabilities are still a barrier. In Latin America, most of the actions to promote accessibility in science communication institutions and museums are being performed on physical infrastructures. However, regarding communicational and attitudinal accessibility, they still have only a few actions and the culture of inclusion is not incorporated into institutional policy and the allocation of financial resources. This mostly happens because many countries are still unable to guarantee the rights of people with disabilities and numerous barriers are imposed in their participation in the scientific universe. In this case study, through a content analysis of qualitative interviews, we discuss how blind and low vision adults from Brazil approach the issue of science in their lives. In the data analysis, we noticed that although they express the desire to engage in science, they claim that disabled peoples' access to education and opportunities to live experiences that add to their cultural capital is difficult. Also, we focus on inclusion and accessibility in science museums, bringing some results and discussions of research conducted with the museum management personnel about institutional policies, funding and human resources training. This research aims to understand contexts and personal stories that impact people with disabilities in the engagement in science and how they feel or not included to transform practices towards a more inclusive science and its communication.

Mariana Fernandes
Oswaldo Cruz Foundation, Brazil

Willian de Abreu
National Inst. of Communication of Science and Technology, Brazil

Luisa Massarani
Oswaldo Cruz Foundation, National Inst. of Communication of Science and Technology, Brazil

871 Visual presentation

Passarinhar Square: The Knowledge Interlaced in the Frames of the Museographic Transposition of an Exhibition of the Museum Dica

Natalia Nunes
Universidade Federal de UberlÃ¢ndia, Brazil

The transposition of content, from an academic or cultural environment, to the museum's environment depends on the perspective of the museum team and its collaborators and the relationships established between them in the process of proposal and development of the exhibition. We believe, however, that it is not only the exposure that carries the marks of the team involved in its proposal and development, but that the intertwining of the knowledge that gives rise to the exhibition can also transform the characters involved in this process. Thus, the present work seeks to understand the exchanges of knowledge made during the creation of the Exhibition "Passarinhar Square" of the Museum Fun with Science and Art (DICA), Federal University of Uberlândia. In order to record the mobilized knowledge, in the development of the work, the moments and important speeches were recorded in the field diary and at the end of the process, questionnaires were applied and interviews were conducted with the purpose of recording the perception of these characters as to their contribution and to the process of construction of the exhibition as a whole. The subjects who participated in the process of construction of the exhibition demonstrated a process of learning and construction of meanings beyond the academic, which involves an affective, creative and professional bond. Thus we realize that understanding the dynamics of how museum staff and collaborators interacted with each other and their knowledge is important for museums, especially science, as they open the way for new forms of transposition. museums about science as well as public interaction with exhibitions, helping to make science museums more attractive and working on scientific communication on a conceptual, reflective and contextual level and not just as a show or something distant.

Silvia Martins
Universidade Federal de Uberlà¢ndia,

935 Visual presentation

Two streams, one bridge :a cultural excursion into SciArt land

Kathryn Eleanor O'Hara
Carleton university, Canada

A search for a unique SciArt aesthetic is timely and transformative. What are we looking at ? Is is simply Art? Is it a tad ArtSci-Fartsy? Is it Outsider Art? Or is the viewing value in its science communication outreach ? Who decides? And how? Particularly in this century, SciArt has grown, popularized by the visual and connective appeal of online galleries and portfolios to fans. While it is true that science can rely more readily on visualizations thanks to the ease that computers turn pixels into pictures, the enthusiasm for a hybrid art form is evident in numerous social media devoted to image and commentary.

Given SciArt's alleged start in Manhattan around 1966 when artists engaged with scientists in a project called 'experiments in art and technology' which spawned robotic art, digital art,media art and, more recently, data visualization art, we now have accessible art works that lean more on a scientific worldview. For example, the Canadian science communication blogging hub 'Science Borealis' defined SciArt as 'any creative expression where the intent of the artist is to convey an understanding of the physical universe.' If this art is then commandeered to communicate some science, does that function diminish the artistic value in any way or does this intent qualify as its singular aesthetic purpose? Is it art? I propose, in this lively project, through audio interviews to ask questions of this nature to artists and sci-artists, curators and critics.

The resulting short presentation (10 minutes) would be a visual tour with interspersed voice over on a series of relevant, curated art works. The audience would also be encouraged to play along as critics by spotting science minded art and through this exercise consider further defining a possible aesthetic for our consideration as science commmunicators and art appreciators.

Kathryn O'Hara
adjunct research professor, School of Journalism and Communication. Carleton University. , Canada

606 Visual presentation

Promoting and Transforming Communication about Science between Preschool Children and Their Guardians at the Museum

Yoshikazu Ogawa
National Museum of Nature and Science, Japan

ComPaSS (an abbreviation for “Communication,” “Parents,” “Science” and “Society”) is an exhibition designed to encourage communication about science between preschool children and their parents (guardians) at the National Museum of Nature and Science (NMNS). NMNS thinks it is important that children share their wonder and discovery at the museum with their parents and take the experience back to their daily lives. It is necessary for children to discover the world of science in the museum together with their parents because they reflect on and learn from what they have experienced. “Parents are intermediaries between children and the outside world, and learning at home is the starting point of all education.” With this basic concept, NMNS sets up natural history specimens as exhibits at ComPaSS to encourage “child-parent communication.” Through playing and sharing experiences using ComPaSS, we aim to let children cultivate their sensitivity and acquire the habit of thinking scientifically based on the Science Literacy Goals (Ogawa et al. 2014 PCST).

The reports by parents who used ComPaSS more than three times have been analyzed. In the past two years, 103 reports about children’s behavior and attitudes were collected. Keywords related to “sensitivity cultivation” and “cultivation of scientific thinking habits” as stated in the Science Literacy Goals were picked up from these reports and analyzed. Several statements indicate that the children continued to show interest in nature and science by talking and asking questions about what they observed in ComPaSS (e.g., noticing the difference of the teeth of animals in picture books, asking questions about which parts of plants are eaten as vegetables, gesturing how the horse would run when seeing the real horse at the ranch, etc.). This suggests that the experiences at ComPaSS were reflected in the children's scientific behaviors and attitudes, which were transformed in their daily lives.

Satomi Kamijima
Officer, Museum Activity Development Department, National Museum of Nature and Science, Japan

Saki Park
Consultant, Healthcare & Public Service, Accenture Japan Ltd., Japan

Tatsuya Ogawa
Officer,Innnovation Center for Nature and Science Museums, National Museum of Nature and Science, Japan

Yusuke Kumano
Chief, Museum Activity Development Department, National Museum of Nature and Science, Japan

1089 Visual presentation

Stakeholders' perceptions about the quality of science communication

Arko Olesk
Tallinn University, Estonia

Both science communication research and practice often tackle with the question what can be consider good or quality science communication. The answers tend to vary and depend on whether they come from scientists, journalists, science communication scholars or ordinary citizens. Often mentioned points in case of media, for example, include accuracy of reporting scientific facts or quality of the reported study. Others, such as Bucchi (2013) also emphasize the role of style. However, we are still lacking a coherent picture of what is considered quality in science communication.

In our study we explore and visualize how various science communication stakeholders understand and explain quality in science communication. We propose a visual presentation that summarizes the maps that our stakeholders create during special workshops exploring the questions concerning quality.

The workshops are taking place between July and December 2019 in five European countries (UK, Ireland, Italy, Norway and Estonia) as part of the Horizon2020-funded project QUEST (QUality and Effectiveness in Science and Technology communication). Each workshop involves representatives of science communication stakeholders: journalists, researchers, science communicators and citizens. The stakeholders use the Manual Thinking visualization method to collaboratively map the elements of quality in general, in context of specific formats (e.g. social media posts, news articles, museum exhibitions), and for specific cases.

The study is valuable for science communication research and practice because the results are produced co-creatively by the stakeholders, reducing the profession-specific viewpoints that are often a source of tensions. Second, the tool allows to express and understand relationships between the elements of quality. The resulting understanding of quality has the potential to transform both science communication practice and research as well as the relations between them and with the society.

Berit Renser
Tallinn University, Estonia

1116 Visual presentation

Building social participation in Brazilian science museums

Bianca Oliveira
University of Sao Paulo, Brazil

Public perception researches conducted in Brazil point to a gap between individuals and scientific issues. This fact, added to the social inequalities present in our country, indicates the need to expand the dialogue between social groups and scientific institutions in order to democratize the knowledge and to increase public participation in science. In this context, this research aims to understand the role of Brazilian science museums with regard to social participation in science and contribute to a greater understanding of the term “social participation”. For this, in its initial phase, questionnaires were sent to educators of Brazilian science museums in order to raise their conceptions about the theme and to list the participatory actions that are developed in their institutions. At the same time, a literature review was conducted. Excerpts from texts containing conceptions of participation and descriptions of participatory actions were placed in dialogue with literature. The meanings expressed in these two sources were negotiated and articulated. From our analysis, we propose that participation is expressed as a way of: i) reducing the barriers that keep people from entering, staying and well-being in the institution; ii) constituting itself as a diversified space, which promotes equity and social justice; iii) cooperating with public, prioritizing their creative expression and authorship; iv) interacting with the exhibition or with other visitors; v) developing citizenship skills, helping publics to participate in society. Thus, with the corpus of data built from the literature and the early participation of educators from different Brazilian museums, five elements emerged, which we consider to constitute multiple facets of “participation" conception: “access”, “identity”, “co-creation”, “ interaction” and “exercise of citizenship”. In the next steps we will apply new questionnaires that reinforce and/or alter previous results, in order to validate these elements.
The visual presentation will be done through a poster.

Alessandra Bizerra
University of Sao Paulo, Brazil

Tatiana Venancio
University of São Paulo, Brazil

1166 Roundtable discussion

From Infodemic to Inclusive Crisis and Science Communication

Chioma Daisy Onyige
University of Port Harcourt/Global Young Academy (GYA), Nigeria

The COVID-19 turned out to be the biggest disaster of the century not only in terms of the highest mortality rate but also in terms of crisis and science communication such as information delay, misinformation and accusations leading to infodemic. There was a delay in releasing essential and lifesaving information from leading authorities such as the World Health Organization (WHO), United Nations. The haphazard crisis communication not only created undue fear, hopelessness but also led to several unintended and devastating consequences. Moreover, the crisis has been used to politicize the cause and impact that has created mistrust in the communication process required to deal with the current situation leading to infodemic. Despite a common threat, varied understanding and messaging led to diverse responses not only across different countries but also at the local, state and national levels. Communication was distorted at varying levels: top-down and bottom-up. Many of these communications didn’t follow the standard operating procedures such as early warning, evacuation messages etc. The unorganized structures led to miscommunications and varied risk perceptions that affected local responses. The round table discussion would facilitate understanding of risk communication in varied and diverse contexts where people from different countries would share their experiences. There will be an opportunity to discuss issues around inadequate planned crisis communication and other threats that were triggered by the pandemic. We will facilitate discussion around how global risk poses new threats that not only trigger the disaster but also compromise the efforts made towards managing the disaster situation. We argue for a more inclusive and engaging crisis communication that involves key stakeholders, including science and societies that understand, plan and respond to global crises and risks in order to avoid misinformation or miscommunication in this highly integrated world of information age.

Shabana Khan
Indian Research Academy, Delhi India/Global Young Academy (GYA), India

Nova Ahmed
North South University, Bangladesh/Global Young Academy (GYA), Bangladesh

Renard Siew
IGDORE; Centre for Governance & Political Studies (CENT-GPS)/Global Young Academy (GYA), Malaysia

Jyoti Mishra
University of Leeds, UK,

637 Insight talk

Enhancing public understanding of paleontology

Luz Helena Oviedo
Smithsonian Tropical Research Institute, Colombia

An alliance among research institutions and universities developed a communication strategy to increase awareness about paleontology. Such strategy included the development of a science popularization book and workshops to distribute it. We conducted 45 workshops in 40 cities in 29 of 32 departments in Colombia. Out of the 40 places, 15 places (37%) were not capital cities (less than 25,000 inhabitants). And 20 were part of distant regions with high presence of afro, indigenous, farmer communities, or affected by armed conflict. 1000 people attended workshops, mainly public school teachers, as well as students, museum educators and librarians. Results from surveys conducted at the end of workshops, indicate that this strategy spark among participants scientific skills such as creativity and observation and referred to social appropriation, protection of patrimony and the value of science.

This experience is an example of a major science outreach effort that went beyond the design of a particular product (i.e. book, video). We share this case for scientists and science communicators interested in developing similar communication endeavors that proof to be of inspiration for attendees, and as an example for research institutes willing to share content with broader audiences and to reach formal and informal education environments. This experience will also be of interest as an experience for countries similar to Colombia, among the most unequal in the world, with major differences between private and public schools, partial school attendance and low quality. In addition, we recognize the importance of mediation in the presentation of science outreach materials, specially in not well known topics such as Deep time.

Main lessons learned and challenges during this two years process, are related with communication among scientists and designers, managing and finding partners, workshop methodology and following up with workshop participants.

Carlos Jaramillo
Smithsonian Tropical Research Institute, Panama

903 Visual presentation

Museum for change: local paleontologists impact their community

Luz Helena Oviedo
Smithsonian Tropical Research Institute, Colombia

What does it take to support a local museum? How science can contribute to the development of a rural community? What are the needs and interests of research institutions when partnering with a community? How large-scale science centers can contribute to small museums? This proposal will draw on a specific experience in Colombia among Museo de Historia Natural La Tatacoa (a rural museum), Parque Explora (science center) and Smithsonian Tropical Research Institute. These institutions partnered to develop an exhibit portraying Miocene fossils and the work of local researchers. This initiative will increase awareness to protect paleontological heritage and also, it is emerging as a possible source of income for the community. So far, locals' interest for science has impacted the community at many levels. In this presentation we will offer a practice insight focusing on the lessons learned from the different actors involved in the project. including the point of view from the community, paleontologists and museum professionals. We will also share the main challenges regarding design, content production, communication strategy and mediation. Lessons learned from this experience will shed light on how museums and scientific research institutions can support local and communitary museums, and viceversa, specially in low income countries where access to science is limited.

Juliana Restrepo
Parque Explora, Colombia

Carlos Jaramillo
Smithsonian Tropical Research Institute, Colombia

Andres Vanegas
Museo de Historia Natural La Tatacoa, Colombia

748 Individual paper

Experts and citizens answer: What science does the ordinary citizen need?

Jorge Padilla
SOMEDICYT, Mexico

Scientific culture is an important and debated concept in science communication communities around the world. A team of researchers and practitioners in science communication from SOMEDICYT in Mexico, developed a research project during 2018 and 2019. The main purposes of the project were: on one hand, to know the scientists', communicators' and decision makers' imaginaries and notions about scientific culture, and citizen's science needs; and, on the other hand, to know the ordinary citizens' imaginaries about science and its function and relevance in society. Ultimatelly, this work refers to the interest of individuals in science and scientific knowledge.

The project consisted of two studies, in one of them the subjects were scientists, communicators and decision makers, and the main topics were the objectives of science communication, the features of a scientific cultured citizen, the science needed by citizens, scientific culture as a social need, among others. It was a quantitative study, developed through an online survey. It was answered by 490 people.

In the second study the subjects were citizens older than 16, from six cities in Mexico. They were surveyed in person. The questions of the survey were about the importance of science, his/her interest in science, his/her opinion about science's risks and benefits, the main concepts and topics about science that they need to know.

The results of both studies were statistically processed and analyzed in two separated sets. Later, some variables and results were compared. We developed a three axes analytical model, based in Laspra's proposal about scientific culture. The findings show important divergences between notions and values about science in both studies. There were some findings related with different conceptions and components of scientific culture among scientists and communicators.

Hopefully, the results of the research will provide useful information for both, practitioners and researchers in science communication.

Susana Herrera-Lima
Instituto Tecnológico y de Estudios Superiores de Occidente, ITESO, Mexico

Ma De Lourdes Patino Barba
Sociedad Mexicana para la Divulgación de la Ciencia y la Técnica, SOMEDICYT, Mexico

Patricia Aguilera-Jimenez
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Martin Bonfi-Olivera
Dirección General de Divulgación de la Ciencia-UNAM, Mexico

Alba Sofia Gutierrez-Ramirez
ITESO, Mexico

934 Individual paper

Using (and abusing) historical time in science communication

Harriet Palfreyman
University of Manchester, United Kingdom

History has become a common feature of much science communication work. In a variety of forms, the public communication of scientific developments and research often begins with a historical dimension as a narrative hook or contextualising device. One area where this is particularly evident is in the communication of medicine and surgery, where the brutality or absurdity of the past is readily invoked in order to celebrate the painless, triumphant interventions of the present. Used in this way, history becomes an uncritical instrument which only fortifies the status quo of contemporary science and medicine.

This paper offers a theoretical reflection on this instrumentalization of history in science communication. Drawing on examples from the public communication of surgery, I consider how history might be better used to inform and intervene in science communication more widely.

The catalyst for this reflection was my work on the Time Travelling Operating Theatre, a 2015 interdisciplinary public engagement project based at Imperial College London. The project was designed to foster dialogue between those working in surgery and those who have never had access to the closed world of the operating theatre. Using elements of historical re-enactment and medical simulation we created three scenarios from surgical history that spoke to the central themes of surgical ethics, practice, and technologies. We hoped that immersing participants in a historical problem could help to flatten the assumed hierarchies of ‘expert’ and ‘lay’ as our clinical participants also found themselves out of their comfort zones in the unfamiliar world of nineteenth-century surgery.

In this paper I reflect on how successful this approach really was and consider how history has more to offer science communication than mere contextualisation. I argue that, critically employed, history can estrange contemporary stakeholders from the status quo, allowing a more productive engagement with science and medicine.

1134 Individual paper

"Trust this expert, beause he is an university professor": A Content Analysis of the mediation of epistemic trustworthiness in German online reporting on Covid-19

Petra Pansegrau
Bielefeld University, Germany

Scientific knowlede and and assessments by researchers take a central role in dealing with the Covid-19 pandemic. Therefore, scientists are a key source of information and take a central role in the media coverage so that they can explain the circumstances of particular measures and recommendations and thus gain acceptance for them. A central challenge here is the need for a high degree of trust in scientists, which must be mediated by media coverage alongside scientific statements.

Our study examines the mediation of trust in scientists in German online reporting on Covid-19 between March and June 2020 using qualitative content analysis. In particular, we investigate how scientists who make statements about findings or recommendations in online articles are attributed trustworthiness there. Trustworthiness here has to be understood as an epistemic one, since it concerns the willingness to accept scientists' statements. Therefore, our analysis is based on three dimensions of epistemic trusworthiness proposed by Hendriks et al. (2015): Expertise, integrity and benevolence. As their evaluation suggests, each of these dimensions has an influence on the assessment of an expert's epistemic trustworthiness.

First results seem to suggest that German Covid-19 online reporting mainly uses strategies to convey epistemic trustworthiness that can be assigned to the dimension of expertise. These include references to academic degrees or positions at universities or research institutes. Aspects from the dimensions integrity and benevolence, on the other hand, are hardly ever found in our sample so far. Since our analysis is still in progress, these results are not yet final. However, they may highlight potential problems in communicating trustworthiness in the context of Covid-19 reporting, as two of three dimensions of trustworthiness seem to be neglected here.

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Tobias Toensfeuerborn
Bielefeld University, Germany

791 Individual paper

Developing a Methodological Tool to Analyze and Evaluate the Design of Science Festival Activities: Theoretical considerations and practical implications

Elpiniki Pappa
Department of Educational Sciences and Early Childhood Education, University of Patras, Greece

During the last decade, science festivals (SF) have been widely used as a science communication approach to bring public into direct contact with scientists and to present current scientific topics. Among the variety of activities taking place in SF, the most prominent are the interactive exhibitions, where audiences- including pupils, adults, families, and others- can interact with STEM professionals and ask questions directly to scientists.

Besides the popularity of such activities, there is no clear theoretical and methodological background to define their design and evaluation. The activities presented in SF interactive exhibitions target mainly school population, and therefore use principles that characterize both science popularization and science education field. Moreover, a SF interactive exhibition presents similarities to the exhibition of a science museum or center.

In this paper, we proposed that in order to design and evaluate the activities taking place in a SF interactive exhibition, it is required the implication of three theoretical fields: a) science communication, b) science museology and c) didactics of natural sciences. Considering the similarities presented between the interactive exhibition of a science festival and a science museum exhibition, we used the “Science Mediation Framework”, proposed by Guichard and Martinand, to analyze and asses the design process of SF interactive exhibition activities. According to this model, during science museum exhibition, the scientific knowledge and scientific objects are transformed into (a) scientific content, (b) media device, and (c) media staging.

Furthermore, based on this theoretical approach we created a semi-structured interview that can be used as a suitable methodological tool to analyse and evaluate the design process of activities presented in a SF interactive exhibition environment. Finally, we discussed the contribution that this approach may have on the improvement of the way that scientific knowledge is communicated and presented in a SF interactive exhibition setting.

Dimitrios Koliopoulos
Department of Educational Sciences and Early Childhood Education, University of Patras, Greece

988 Visual presentation

Science, Society and Science Communication - How different worlds merge

Ilka Parchmann
Leibniz Institute for Science and Mathematics Education (IPN), Germany

Transformation processes require drivers as well as structures. The growing requirement of forming better interfaces between science and society, and the demand for more research-based developments, are two drivers in University science communication processes.

Kiel University (CAU) has begun to merge different measures for science and science communication trainings for doctoral and postdoctoral researchers towards a more systemic program of interactions between science and science communication qualifications including new career perspectives. Main actors are the Graduate Center in cooperation with other centers, and the Kiel Science Outreach Campus (KiSOC). The latter provides expertise and prototypes of research and research-based designed approaches. The Graduate Centre has a strong base of training programs like the “Docs go Science Show”. Both institutions strongly interact with all priority research areas, Collaborative Research Centers and Clusters of Excellence at Kiel University; thereby providing different interfaces between science and science communication trainings as part of the junior scientists´ career pathways.

The visual presentation, consisting of a poster and a video clip, presents the overall program of research-based developments and trainings as well as exemplary measures. PhD students get first insights into merging worlds between science and society based on science communication formats in their integrated research training groups. Based on the reflection of goals they work on communication tools and formats supported by KiSOC researchers and get involved in science communication programs for different audiences. A science communication certificate program enables deepening skills in areas like presentations or interactive as well as participatory formats. For those interested in career options in the field of science education and communication the Research Educator program provides further education and co-operation with institutions like schools and out-of-school learning environments.

Carolin Enzingmüller
Leibniz Institute for Science and Mathematics Education (IPN), Germany

Ulf Evert
Key Skills Center, Kiel University, Germany

Sabine Milde
Graduate Centre, Kiel University, Germany

549 Individual paper

Exploring transformative social policy through an enhanced measurement of the South African public understanding of science: past research and future endeavors

Saahier Parker
Human Sciences Research Council (South Africa), South Africa

South Africa has seen 25 years of democracy that significantly changed the political and social landscape of this country. The government has made significant efforts to correct the injustices of the past, establish economic reform policies and strategies to promote access to basic services and opportunities. However, South Africa still faces many challenges including high levels of inequality, unemployment and a drastic shortage of an adequately skilled workforce to drive future growth within a knowledge economy context.

Science and Technology (S&T) play a major role in the economic and eventual social development of a country by promoting economic opportunities, employment creation, social development, and democracy building. With the advent of the fourth industrial revolution, South Africa has set a critical ambition to address these challenges by harnessing the power of S&T to transform society. Key toward this ambition remains an awareness of public support, understanding and attitudes to science as critical factors in the development of transformative public policy. An appropriate science education policy, highlighting the importance of effective science communication becomes a prerequisite in harnessing these opportunities.

This paper presents a history of public understanding of science measurement in South Africa. Contextualising South African society & the policy landscape, it examines the context of science and its complex relationship within the multifaceted nature of the South African public(s). Examining the results from the first nationally representative survey of the South African public understanding of science, the use of new indices is proposed to provide additional insight into the evolving domestic social landscape. With the changing nature of a digital society, shifting modes of production and global competitiveness, the critical role of technology in society is examined. Furthermore, the factors that shape transformations of the science-society interface are explored as opportunities for science policy makers into the 21st century.

863 Roundtable discussion

Communicating the dangers of pseudoscience: a global challenge

Natalia Pasternak
Institute Question of Science; University of Sao Paulo, Brazil

Bad science and pseudoscientific claims affect us all, and even more so when they are miscommunicated to the public. Often, communication of science worldwide is particularly focused on the beauty of science and technology. While we all agree this work is of utmost importance, the speakers in this session have been working in a different field of science communication, aimed at the promotion of critical and rational thinking, the questioning of extreme claims, and why the epistemic authority of science should be taken into account.

Our goal is to provide the public with the appropriate tools to make science-based decisions in their daily lives. Decisions such as whether to vaccinate your children, whether to turn to homeopathy to cure your illness, whether nuclear energy is something to be afraid of, are all deeply influenced by how people understand scientific thinking and the scientific method.

Our work in each of our own countries provides important insights into how to communicate the process of science, rather than just the results, and how we come to scientific consensus. Michael Marshall has successfully raised public awareness about the dangers of alternative medicine in the UK, working together with national press, and leading to changes in public policy; Angela Bearth has conducted many surveys on how risk communication directs consumer behavior; Natalia Pasternak has launched an Institute in Brazil to promote science-based public policies, and has conducted the first national survey on the understanding of alternative medicine; and Ray Hall has measured how to communicate unwarranted beliefs with college students in the US.

At this roundtable, we will share our experiences and talk about the challenges of communicating bad science and pseudoscience in a global perspective, as well as providing tools for science communicators on how to address these sensitive issues in the media.

Michael Marshall
Good Thinking Society, United Kingdom

Angela Bearth
ETH, Institute for Environmental Decisions, Zürich, Switzerland

Raymond Hall
California State University, Fresno, United States

567 Individual paper

From communication of historical knowledge to time travels

Manolis Patiniotis
National and Kapodistrian University of Athens, Greece

The communication of historical knowledge to the wider public has long been a crucial practice for the constitution of nation-states and the ideological control of their citizens. The locus of this communication has traditionally been the impenetrable interface between professional historians and archaeologists, on the one hand, and the “lay people”, on the other. The values that were involved in this exchange across the border of expertise were truth and lie or prevarication: The stories narrated by the experts were perceived either as indisputable matters of fact or as intentional attempts to misrepresent the past in order to legitimize particular forms of social order.

A new cultural technology that becomes gradually available to the public as a result of the transition to the digital era changes the rules of the game. This technology is, indeed, gamification and concerns the spread of skills and social practices associated with computer games to a range of social activities that transcend gaming and computing themselves. Among other things, gamification affects the way people perceive the established intellectual hierarchies: “Why read about ancient Rome when I can build it?” is an astute question raised by an elementary school student at a Game Developer's Conference.

Taking advantage of the affordances provided by gaming technologies, “lay people” can make sense of the contingency of historical events. They not only accept or question the accuracy of mainstream historical accounts, but are able to fashion timelines that persuasively lead to alternative historical configurations. The aim of the presentation is to explore the consequences of this new cultural technology for the communication of historical knowledge, and contemplate about the new forms of historical awareness that arise as a result of the public involvement in the production of expert knowledge.

Elias Stouraitis
National and Kapodistrian University of Athens, Greece

Petros Petridis
National and Kapodistrian University of Athens, Greece

1106 Individual paper

Escape room games in public engagement: Research and practice of three case studies

Ran Peleg
University of Southampton, United Kingdom

Escape rooms are games in which players solve puzzles to successfully escape a closed room or succeed in a mission. Escape room have gained huge popularity in recent years. Can the allure of escape rooms be harnessed to engage and interest the public in science?

Over the past four years I have worked with colleagues to build games that bring the fun and fascination of escape rooms to venues of public engagement and schools. We have focused on introducing intellectual challenge, group work and real experiments to create an immersive experience – one in which participants are transformed to a different place and time through a story.

This presentation will combine practice and theory. It will focus on the lessons learned from designing and building such games as well as initial research findings. Specifically it will focus on three cases:

1) Two escape rooms were built in existing exhibitions of a small natural history science centre. The room would only operate in the evenings not to impede the regular operation of the centre. In a research on audience participation we tried to understand if such a format can attract new audiences to the museum.

2) A mobile escape room on the topic of environmental conservation. The escape room will be debuted in the following few weeks in a science festival. By the time of the conference the escape room will have been presented in several international venues and initial results will be available on the effect of the transformative immersive experience on participants' behavioral change.

3) An escape room built for an interdisciplinary festival on the topic of space. The game was purpose built for a specific venue offered by the festival. This case will demonstrate design constrains set between subject matter, different stakeholder and the limitations of a science festival.

607 Individual paper

Who is inspiring me? Scientists telling science stories

Giuseppe Pellegrini
Observa Science in Society, Italy, Italy

Research on Public Communication of Science and Technology (PCST) has been focused to describe different models and activities in order to understand and evaluate the improvement of public understanding of science. The role of scientists is crucial and relevant given in recent years many of them have been involved in communicative actions. It is therefore important to carefully study the ways in which scientists committed themselves in the public sphere communicating to the public of non-experts.

To address this issue, a study aimed to evaluate the researcher communication strategies in public events has been developed. The research was carried out as part of SHARPER (SHaring Researcher's Passions for Excellence and Results), an Italian project developed in the framework of the Researcher's Night funded by the European Commission, one of the biggest events in science communication in Europe that involve 300 cities.

During these events, from 2017 to 2018, information about researcher expectation, preparation and communication strategies were collected. Moreover, the study recorded information on the event organization, management and development. All the outcomes were collected using an ethnographic approach, a type of qualitative research method that combines immersive observation and directed one-on-one interviews.

The results of the study showed several communication strategies that can be combined based on the researchers skills to adopt different communication styles and instruments. Furthermore, the study investigated - for the first time - the ideal models of communicators that researcher would emulate when they engage in the public sphere. The results also showed the correspondence (or not) between the ideal models and the communication actions. Analyzing different formats of communication, the observation showed how scientists played their role in communicating science to non-experts in different contests: from formal to informal situation.

Andrea Rubin
University of Bergamo, Italy

605 Roundtable discussion

Public Communication of Science: trust and credibility in the eyes of the public

Giuseppe Pellegrini
Observa Science in Society, Italy, Italy

The results of the International CONCISE project regarding channels and sources of communication.

In this roundtable we provide and discuss an overview of the main results collected through five Public Consultations carried out within the Concise European project. 500 citizens of five different countries were involved in discussing four topics on communication: climate change, vaccines, GMO and complementary and alternative medicines.

Our primary aim is to focus on patterns of trust by which EU citizens acquire their science-related knowledge, and how this knowledge influences their beliefs, opinions, and perceptions. In so doing, we take into account the use of channels and sources proposing an analysis of how citizens believe these important elements of the public communication of science to be credible. Furthermore, we propose an analysis of the level of public engagement expressed during consultations and the development of different practices of citizens science.

We aim to provide insight into the complexity of public communication of science and technology and the social and methodological richness that it embodies by highlighting the relevant role of public opinion and public participation. To this end, we propose four dimensions by which to map this rich domain of research: actors, relationship, trust and means. Our concluding argument is that studying these dimensions by observing knowledge, beliefs, opinions and perceptions would do well to combine analytical and normative prerogatives for understanding the recent evolution of public communication of science and technology.

Carolina Moreno Castro
University of Valencia, Spain

Ana Delicado
ICS University of Lisbon, Portugal

Andrea Rubin
Università di Bergamo, Italy

735 Visual presentation

Data Scraping to the rescue: settling Brazilian public communication of science's debate?

Marcelo Pereira
UFMG, Brazil

To compare the public communication of science outputs in 4 Brazilian public universities: UFMG, UFOP, Unicamp, and UFSCar; we conducted an exploratory analysis of data obtained from public platforms with information about academic outreach activities in those institutions.

Using data scraping techniques, we collated keywords used by researchers in their publications and the description of science outreach activities and projects generating a word frequency table and word cloud. Word lists will be analyzed by ecological techniques (such as Jaccard index) for comparison of biodiversity composition between different areas.

Our hypothesis is that meaning is given by context, which can be revealed by the occurrence and frequency of keywords. If the words that occur in conjunction with the key phrases are similar between the different terms, there is no significant semantic difference between the terms. That analysis had a potential to reveal the semantic dispute in the field: different expressions are used to refer to activities related to public communication of science such as science popularization, public understanding of science, science literacy, among others, highlighting the differences in philosophical point of view between research groups regarding the topic associated with the usage of those terms.

Comparisons between output database platforms will be made too. In the case of UFMG, two platforms are used: one mostly concerned with academic publications, and another specialized in academic outreach activities.

The initial results suggest strong similarities in the keywords related to science popularisation in articles published by researchers of the Universities analyzed. We conducted a preliminary investigation, expecting that that association could be a result of a close collaboration between the institutions, but the data hint otherwise: only one paper in the subject co-authored by members of both institutions was found so far.

Roberto Takata
UFMG, Brazil

Silvania Nascimento
UFMG, Brazil

813 Insight talk

Crossing the Boundaries and Re-Inventing Science Communication: The "Prisma Magazine" case study

Dimitris Petakos
National and Kapodistrian University of Athens, Greece

The aim of this paper is to present an approach to science communication, put to practice in the Greek science magazine Prisma. The magazine is published twice a month, as an insert in the daily Greek newspaper Avgi. Its articles are also published online, in the newspaper's website. It was first published on September 2016. Its editorial team consists of active scientists, historians of science and science communicators. Prisma magazine places special emphasis on the challenges put forth in the new digital era.

During the last two decades, the expansion of digital technologies and their subsequent everyday use by experts and non-experts alike, has resulted in almost equal access to the sources of information. Far from implying that the distinction between experts and non-experts no longer exists, in a practical level it renders the boundaries vague and presents new challenges for science communication. In this new ecosystem, the complexity of scientific endeavor is blown open, creating an overwhelming amount of information and new spaces where knowledge is produced and negotiated.

The Prisma magazine aims to highlight the complexity of factors in the production of knowledge. This is why tha magazine approaches science and technology as complex human endeavors with ever-changing boundaries. The magazine focuses in (i) the historical and anthropological dimensions of knowledge production (ii) the political, economic and social factors at play, (iii) the hidden aspects of research, such as failures and the pressure to publish, and (iv) the challenges of interdisciplinarity, as well as the intersection of science, technology and arts. In this paper, we will present specific examples from Prisma magazine articles related to the above issues and try to evaluate how such an approach may work in an era where citizens acquire direct access to research results and the boundaries between experts and non-experts tend to dissolve.

Manolis Patiniotis
National and Kapodistrian University of Athens - Professor of History of Science, Greece

Dimitris Petakos
National and Kapodistrian University of Athens - PhD in History of Science, Greece

Lida Arnellou
National Center for Scientific Research "Demokritos" - PhD in Science Communication, Greece

Ioannis Kontogiannis
Leibniz-Institut für Astrophysik Potsdam (AIP) - PhD in Astrophysics, Germany

562 Individual paper

Beyond the deficit model: Non-paternalistic knowledge communication as responsible concept of mainstream PCST

Hans Peter Peters
Research Center Jülich, Free University Berlin, Germany

The call for dialog as the 'gold standard' in public communication of science and technology is ubiquitous. Some even denounce any form of knowledge dissemination from science to public not based on dialog or public engagement as application of the 'deficit model' – the utmost form of contempt our community has to offer.

I do not dispute that public discourses over science and technology and engagement activities are desirable, useful and needed in many communication contexts. Yet, we observe that the bulk of today's public communication of science still relies on one-way dissemination of messages – directly from scientific sources to the public by means of scientist-authored articles in popular journals, books and on university websites, for example, or mediated by journalists, bloggers, government agencies and stakeholders. Even channels which invite feedback and would allow debate are used that way only by a tiny minority of 'recipients'.

Does this prove the lamentable state of public communication of science, the disrespect of scientific communicators for the public, or the public's disinterest in science? Or do we have to acknowledge a public demand not only for dialog but also for straight information that can best be served by dissemination of science carefully reconstructed for public consumption (to borrow a term from Sharon Dunwoody)?

In my presentation I argue that knowledge dissemination does not necessarily imply application of the deficit model, and that in many instances dissemination is the adequate answer to public information demands. The relevant question is whether and how dissemination of scientific knowledge is possible without falling into the trap of deficit model thinking. I conclude by sketching a concept of "non-paternalistic knowledge communication" that avoids interpreting the gap in special knowledge between scientists and laypeople in terms of a master-student relationship, and does not expect uncritical submission of laypeople to scientific authority.

854 Individual paper

Threat without efficacy? Transforming coverage to engage the public during vector-borne disease emergence

Linda J. Pfeiffer
Purdue University, USA, United States

The range of mosquito-borne diseases are increasing with climate shifts simultaneously with the rise in insect resistance to known, and safer pesticides - resulting in decisions about how to balance the complex risk trade-offs of disease control and the socially imposed risks of pesticide exposure. The media play a key role in construction of these risk tradeoffs and in informing the public of the evolving science. The outbreak of Zika virus in Miami-Dade County (2016) illustrates a (missed) opportunity for journalists to utilize evidence-based messaging strategies to meaningfully translate the emerging threats, as well as to structure in efficacy cues to enhance uptake of protective public action. This study analyzed six months of regional media coverage of risk during Zika Virus outbreak in Miami-Dade County (2016) to identify: 1) media source utilization of threat frames across the risks introduced by the Zika crisis, 2) media source characterization of solutions to risk tradeoffs, and 3) how solution frames are paired with efficacy cues to enhance public uptake of protective health behavior. Our analysis revealed the differential role that key media sources take in framing threat and empowering informed public response during a public health crisis. Public health officials and politicians dominated coverage, while industry sources, scientists and the public found a lesser voice in the media. Overall, threat frames were utilized by key sources more than twice as often as solutions. Efficacy cues were absent on about half of these solutions. Of interest, efficacy cues were characterized primarily by directives for action or highlighted the negative efficacy of solutions. Negative or mixed efficacy cues far outnumbered positive efficacy cues when sources proposed solutions - decreasing the likelihood of public engagement with health protective behaviors. The implications of highlighting threat, while minimizing the efficacy of solutions in public health messaging are discussed.

Beth Forbes
Purdue University, United States

652 Insight talk

Science in silence: breaking language and cultural barriers using science theatre

Shanii Phillips
University of Western Australia, Australia

Theatre is a powerful medium to share ideas, promote change and bring communities together, and science theatre is no exception. Science shows are traditionally performed using a combination of demonstrations and explanations, using the spoken word to communicate scientific themes with the audience. They are usually performed to audiences who speak the same language and are from a similar cultural background. We (two science communicators, working at a science centre in Australia) toured an innovative science show to the Beijing Science Festival in 2019. To overcome language barriers, we presented the show without speech, performing a series of demonstrations exploring the properties of liquid nitrogen choreographed to music. Through modelling behaviour on stage of our own cultural values of science, including fun and curiosity, as well as the scientific process we were able to share our ideas despite potential language and cultural barriers, with many audience members engaging with us after each show. By continuing to push the boundaries of what we define as science communication, we can continue to construct new ways to craft connections, create meaning and share ideas with wider audiences.

653 Visual presentation

An explosive impact: how do science shows influence teenage audiences?

Shanii Phillips
University of Western Australia, Australia

Science shows use the medium of theatre to communicate a science message, and are commonly performed in museums and science centres. We investigated the impact of science shows on high school students' science study and career decisions, and compared the perceptions of teenage audiences with the strategies used by science show presenters. A mixed-methods approach was used: students completed pre- and post-show surveys and follow-up focus group, while semi-structured interviews were conducted with presenters. After watching a single science show, there was a significant increase in students' motivation and confidence studying science. The most influential demonstrations were dramatic, and students valued relevant links between the demonstrations and the real world. Science presenters' strategies generally aligned with what students enjoyed during the shows. Interestingly, there were noticeable differences in responses were found between presenters from different departments of the same organisation and presenters from a previous study conducted by Wendy Sadler (2004). This study has found evidence for the value of presenting science shows for teenage audiences and highlighted several opportunities for future research.

Miriam Sullivan
Curtin University, Australia

Ann Grand
University of Western Australia, United Kingdom

809 Individual paper

What news from the sea? Assessing the presence of marine issues in the Portuguese quality press over time

Bruno Pinto
Faculty of Sciences of the University of Lisbon, Portugal

The current study aimed at characterizing the marine news in a Portuguese quality newspaper between October 2002 and December 2010. The search for keywords related to the marine environment resulted in the collection of 1309 news items, with a mean number of 13.22 news per month. There were two peaks in the number of news corresponding to the oil spills of the tanker Prestige in Spain and the rig Deepwater Horizon in the USA. The most common themes on the studied news were pollution, marine species/habitats and fisheries, while others such as coastal planning or marine science research were less relevant. Additionally, it was found that news about marine sciences frequently used only a neutral tone (78%), with the occasional use of a positive (12%) and or a negative tone (10%). The modest number of news found seem to be related to the low public interest and knowledge on environmental and science themes shown in several national surveys, to the small number of Portuguese journalists specialized in these issues, and to a reduced connection between journalists and scientists, NGOs, national and international governmental bodies and others. Initiatives such as communication using charismatic marine species, workshops about the sea which involve journalists, or citizen science and community-based projects could help to generate more media interest about the sea.

José Lino Costa
University of Lisbon, Portugal

Henrique Nogueira Cabral
University of Lisbon, Portugal

891 Individual paper

Clearly Communicating Clinical Trials (C3T): Bringing clarity to clinical trials

Andrew Pleasant
Health Literacy Media, USA, United States

Health Literacy Media "a globally active health literacy non-profit organization based in the United States" launched Clearly Communicating Clinical Trials in 2017. The goals and needs are to improve the quality of communication about, during, and after clinical trials to increase public understanding and engagement.

From a policy perspective, part of the driver for this development began in 2014 when the European Parliament released the Regulation 536/2014 on clinical trials on medicinal products for human use. In practice, this ultimately led to a requirement for so-called "Layperson Trial Summaries" or "Plain Language Trial Summaries."

From a scientific and management of successful trials perspective, this approach when applied broadly from the beginning to end of a clinical trial is a method to attract participants, reduce drop-outs, increase correct understanding and use of trial protocols and documents ranging from informed consent to reporting of adverse events, and to increase informed engagement with and public communication about clinical trials.

Since 2017, C3T has produced many clinical trial related documents, websites, and informative videos for multiple organizations ranging from small start-ups to large pharmaceutical corporations and governments. We have produced work involved in recruitment, informed consent, retention, results, evaluation, and communication about clinical trials.

We work with partners and sponsors to increase the level and nature of engagement of participants in the clinical trials they are part of, and no small part of that work is improving the communication skills of clinical trial staff ranging from administrative support to lead trial physicians. We have also worked to directly improve the internal and external communication of the major sponsors of clinical trials.

This presentation will provide an overview of C3T's work, with examples of best practices, and suggestions for next steps to ensure the sustained and equitable participation of all parties involved in clinical trials.

Catina O'Leary
Health Literacy Media, United States

Deborah Collyar
Health Literacy Media, United States

1174 Visual presentation

Experience gravity with a rubber sheet: a DIY low-cost educational kit

Adriana Postiglione
Roma Tre University - Department of Mathematics and Physics, INFN Roma Tre Section, Italy

Admire the planets moving. Follow a ray of light on its journey through the stars. See a black hole up close. Discover gravitational waves. Understanding the deeper nature of space and time. All this can be done in the classroom and at home, with only a rubber sheet and some marbles!
This is the aim of the open access eBook “Sperimentare la gravità con il telo elastico: linee guida e trucchi – Experience gravity with the rubber sheet: guidelines and tricks” [1] [2] developed by Adriana Postiglione and Ilaria De Angelis of the Department of Mathematics and Physics of the Roma Tre University. Inside the book, the instruction to build a DIY low-cost kit and eight educational cards guide the user step by step in discovering gravity, the force that dominates our Universe. During this talk we will present the project, from the first ideas and attempts to the final realization, including the successful usage experiences during outreach activities and school projects [3]. If possible, a live demonstration of the usage of the kit will be also provided.

[1] A. Postiglione, I. De Angelis, Sperimentare la gravità con il telo elastico: linee guida e trucchi - Experience gravity with the rubber sheet: guidelines and tricks, ISBN: 978-88-3381-157-4, Edizioni Efesto (2020)

[2] A. Postiglione, I De Angelis, Experience gravity in the classroom using the rubber sheet: an educational proposal from the collaboration between university and school, 2021 Phys. Educ. 56 025019

[3] A. Postiglione, I De Angelis, Students' understanding of gravity using the rubber sheet analogy: an Italian experience, 2021, Phys. Educ. 56 025020

Ilaria De Angelis
Roma Tre University - Department of Mathematics and Physics, INFN Roma Tre Section, Italy

659 Insight talk

The Impact of Science Communication Competitions on the Capacities of the Next Generation of Science Communicators

Mohamed Elsonbaty Ramadan
Freelance Science Journalist and Science Communication Consultant, Egypt

Public communication of science and technology (PCST) has gained increasing importance and recognition worldwide, due to the expansion of science and technology, as well as the change in ideas and attitudes towards the place of science in society. Therefore, many different training opportunities are offered to members of the scientific community to prepare them for PCST. One route is through flash talks science communication competitions, where participants are challenged to present a scientific topic in an accessible way to non-specialist audiences in few minutes. Examples of these competitions include FameLab, Three Minute Thesis, and Science Slam. However, little research has been conducted on the impact of such competitions on science communication skills of the participants.

The aim of this research will be to investigate the impact of science communication competitions on science communication skills of undergraduate and postgraduate students, early career researchers, and established scholars. The following objectives have been identified to achieve this aim: exploring different science communication competitions worldwide; analyzing science communication competitions' impacts on participants' science communication skills; and comparing science communication competitions with other means of training in PCST. This research will use mixed methods combining qualitative and quantitative strategies, through adopting different research designs as experimental and comparative designs, where semi-structured interviews, pre- and post- questionnaires, focus groups and online questionnaires will be used.

This research will contribute to science communication research through: better understanding of the role of science communication competitions in developing science communication skills; identifying best practices for achieving maximum impacts of science communication competitions; and developing a theoretical framework for improved training in PCST. From these, a deeper understanding of science communication competitions and their impacts on enhancing public communication of science will be derived, where there is a gap in science communication research.

819 Individual paper

The cancer pill controversy on Facebook: the clash between scientific authority and patient experience

Marina Ramalho e Silva
Museum of Life, Oswaldo Cruz Foundation, Brazil

This presentation proposal reports an analysis of a Facebook post and its comments around the controversy of synthetic phosphoethanolamine, known as "cancer pill" in Brazil. Since the 1990s, the substance was produced and distributed free of charge by a renowned Brazilian public university (University of São Paulo) to cancer patients, even without having official registration from the Brazilian regulatory agencies. In 2014, however, the University banned the distribution, leading patients to request access to the substance through lawsuits and triggering a court battle that generated national commotion and news headlines, including a Nature editorial piece. On the one hand, cancer patients and their families claimed the right to access the compound; on the other hand, scientific community and medical associations pointed to the risks of supplying a substance with no scientific evidence of its safety nor efficacy in human beings. In our study, we analyze the most commented post – as well as its comments – of the main Facebook page dedicated to phosphoethanolamine. This page was identified by searching for the keywords “Fosfoetanolamina” and “pílula do câncer” in Facebook (in Portuguese) and was selected because it contained the highest number of likes. A quantitative analysis has shown that most of the comments – more than 2.000 comments in just one post – had arguments in favour of the phosphoethanolamine use, purchase and sale. In addition, from a qualitative analysis of these comments and taking into account the current post-truth context, we discuss the clash between the official scientific authority – which uses scientific methods to chancell its arguments – and the cancer patients’ authority – who draw on their experience to support their discourse – publicized in a recent technological platform: Facebook.

Vanessa Brasil de Carvalho
House of Oswaldo Cruz, Oswaldo Cruz Foundation, Brazil

Alan de Jesus
National Institute of Science and Technology for Public Communication of Science and Technology, Brazil

1091 Visual presentation

Science Communication Lab - Transforming practice through an exercise of collective intelligence

Rocio Ramirez
Clemente Estable Biological Research Institute, Uruguay

Although science communication is gaining attention and value globally, in many countries of Latin America there is no formal training. Most opportunities are virtual, strongly academic, costly, and for people already working in the fields implied.

I would like to present a training cycle we are developing in Uruguay at the Spanish International Cooperation Agency (AECID) Training Centre since 2018, the “Science Communication Lab” whose characteristics make it worth sharing and replicating in other countries:

1. it’s interinstitutional, interdisciplinary and focused on cooperation and public policy; 2. it occurs out of academia but is organized and led by professional science communicators and advocates from academia (I lead it with journalists, researchers and politics); 3. it rapidly gained the support of educational, cultural and political organizations: Unesco, OEI, ANII, Science and Technology National Secretary 4. It sparked huge interest from the public: first edition convoked 120 students from several countries; 5. Topics start with the basic theory and history of science communication while being reflective, dialogic and practice centered; therefore, topics and formats are dynamic, evaluated and changed based on the results, social trends and public agenda, and range from basic outreach tips or social communication strategies to making viral videos on Tik Tok.

This training model is different because it specifically considers public policy and confronts different “working realities” to put intelligences into dialogue and collective practice.

It has growing impact in the academic field since most students are academics and have written outreach pieces for local media, which in turn attracted other researchers for the next editions. We know it’s political impact because many public agencies related to CTI and education stated it, have participated or want to take part in the future. Finally, AECID itself and the partner organizations are already planning to organize a third regional edition.

760 Insight talk

Transforming culture through community-led science engagement

jackie randles
Inspiring Australia, Australia

Inspiring Australia is the national strategy for public engagement with science & technology. As a state manager, I've created a Regional Science Hub network to encourage diverse communities to develop locally-relevant science engagement programs.

Through a critical analysis of highlights gathered from both audience and presenter survey responses and an appraisal of the intentions of various community-druven program formats, I will show how engagement projects addressing issues that are locally relevant resonate strongly with regional audiences. I will demonstrate the potential of networks to positively influence community attitudes to science and transform culture given the right policy and funding settings. I will also identify what I have come to understand as barriers to enabling genuine community engagement with science through superficial and unsustainable approaches to science communication.

A dynamic and evolving network of community presenters, Science Hubs create participatory experiences that regularly connect, inspire and influence diverse audiences. Research questions are explored in a variety of formats – from talks, panels, pub nights and forums to films, festivals, plays, art projects, guided walks and field days held on rural farms.

Since 2013, a sustained approach supported with small grants has created strong regional audiences for science-related programming. Events always include opportunities for informal discussion, adding social connection and enjoyment to the science learning experience.

Participant feedback indicates that the welcoming interactions offered regularly by Science Hubs are highly valued and successfully engage diverse audiences with scientific knowledge, building scientific literacy amongst community members who may have had little exposure to science previously. Networks flourish, friends are made and knowledge is shared.

The network model is especially powerful, fostering strong local connections between community members and scientists and offering women, Indigenous representatives and those from migrant backgrounds equal opportunities to participate as audience members as well as modelling success in science careers.

1124 Visual presentation

Its my time, its my clock!

Sangeeta Rani
Department of Zoology, University of Lucknow, India

Imagine having a faulty clock? We will certainly miss the opportunity and be the loser!

The concept of time originates with the adjustment of body's physiology to the external environment via biological clocks. We all have a body clock that organizes daily and seasonal activities at the most opportune time of the day and year.

The disturbed clock function will lead to misalignment of internal time with the external time. The common risks associated with it are the compromised sleep quality and quantity (sleep fragmentation, altered duration, increased inertia and latency) leading to daytime sleepiness and fatigue, cognitive impairment, anxiety, depression and mood disorders. This reduces the efficiency of individuals.

The extended hours of artificial light at night due to work environment or social activities and the use of social and electronic media have extended our day into night causing social jetlag. The young generation being tech savvy is more prone to such disorders. This compromises their grades and overall performance. Thus, the technology has hijacked our quality of life.

The disturbed clock can be corrected by adjusting the body functions with the rhythmic environment e.g. simply by rescheduling the school start times, the natural sleep wake cycle can be restored and the sleep quality may improve significantly.

The understanding of body clock functions can be useful to the students, teachers, and parents in resolving the clock related health problems by integrating the expertise of behaviourists, physiologists and psychologists.

Thus, the theme for PCST2020 Time, Technology or Transformation is quite relevant in the current scenario. It conveys the message how rapidly changing technologies have transformed the concept of time in biological world. Further, the recognition of field by Nobel Committee for Physiology or Medicine 2017 is a testimony to the importance of biological clocks for us!

Shalie Malik
Department of Zoology, University of Lucknow, India

707 Visual presentation

Its my time, its my clock!

Sangeeta Rani
Department of Zoology, University of Lucknow, India

Have we ever asked why are we awake during day and sleep at night, or have sufficient energy to work during the day and feel tired at night? Who tells us that time? Interestingly, all the organisms including human have a biological clock that ticks all the time, reads the environmental information such as light, food, and temperature etc. and fine-tunes our body clock to match with that of the external environment. Our daily rhythms such as feeding, locomotion, and sleep etc. are regulated by these clocks. Amongst the daily behaviors, sleep is very important clock regulated function as improper sleep may cause various physical and mental ailments. Sleep quality and duration are affected by light intensity and spectrum. Besides, the food schedules can shift the clock function forwards or backwards. These cues may also make them weaker or stronger. This suggests that our body clock has a role in taking care of our physical and mental health and therefore we should listen to it. The use of technology and social media has stretched our day into night. It has changed meal and sleep timings leading to clock disruption. The clock disruption is linked with sleep disturbances, cognitive impairment, anxiety, depression and mood disorders. Therefore it is high time that we take care of our biological clock and say to the world "Its my time, its my clock!"

Shalie Malik
Department of Zoology, University of Lucknow, Lucknow 226007, India, India

1141 Insight talk

The humanistic story of COVID-19: Communicating the complexity and science of COVID-19 and global health surveillance through innovative digital, new media approaches

Susan Rauch
Embry-Riddle Aeronautical University, United States

The impact of COVID-19 as a global pandemic affected the world from both a health and communication standpoint from which public audiences continue to seek out simple explanations to complex scientific information. According to Budd et al (2020), “digital technologies are being harnessed to support the public-health response to COVID-19 worldwide” to include public communication. Therefore, the field of science communication should consider the currency and relevance of innovative digital new media platforms as a humanistic approach to inform public audiences about complex science and global health threats such as the novel coronavirus or COVID-19 pandemic.

The complexity of communicating science becomes lost among citizen and public understanding whereby science communicators must continue to adapt to changing digital media landscapes in response to citizens who engage with issues in science and technology. As a direct appeal, new transmedia web sources have emerged as interactive approaches to communicate the scientific story of COVID-19 (Ting, Lawrence, Dzau, & Wong, 2020; Doyle & Conboy, 2020; Mheidly &Fares, 2020). Since March 2020, interactive web platforms, such as the World Health Organization’s COVID-19 dashboard and Esri storymaps, have emerged as go-to public sources for information. Public web searches related to “COVID-19, science communication, storymaps or photovoice, and digital technologies” alone yielded between 182,000 and 340,000+ results (and continues to grow), while peer-reviewed scholarship produced 13,000+ peer-reviewed articles.

This talk evaluates humanistic approaches to science communication and the global impact of COVID-19 by examining emerging trends in interactive, digital photovoice projects and storymaps supported by transmedia design that simplify the complexity and human story of the global pandemic.

796 Insight talk

Key principles for equitable and effective research impact

Mark Reed
Newcastle University, United Kingdom

The world is facing unprecedented challenges on a scale that has never been seen before, and the need for effective evidence-informed solutions has never been greater. As such, it is important to understand how scientific research can deliver impact, and identify the mediating factors that can enable or constrain our ability to achieve positive social, economic, and environmental outcomes. In this perspective we introduce three/four key principles, based on an analysis of literature, that need to be considered to ensure our research impact is robust and equitable: context, voice, design, and power. Understanding context can provide researchers with increased awareness of the broader external factors that may influence whether or not their research can deliver impact. Accounting for voice can significantly affect how a research programme or impact pathway is developed, who is included, and who benefits. Appreciating design can aid researchers in maximising their opportunities to deliver positive impact, while minimising the potential for any unintended negative outcomes. A better understanding of power, and how power is distributed, can be used to identify how we can deliver the most impact, and whether power might need to be redistributed to ensure research can deliver positive impacts. Together, these four key principles can help guide researchers to a better understanding of the broader factors that may enable or constrain their ability to achieve impact, while ensuring research outcomes are positive, robust, equitable, and effective.

Rebecca M. Jarvis
Institute for Applied Ecology New Zealand, School of Science, Auckland University of Technology, Auc, New Zealand

Chris Cvitanovic
Australian National Centre for the Public Awareness of Science, Australian National University, Can, Australia

Prue Addison
Interdisciplinary Centre for Conservation Science, Department of Zoology, University of Oxford, Oxfo,

821 Individual paper

What analyzing fact checks can teach us about science communication

Gudrun Reijnierse
Radboud University , Netherlands

Science news reporting is under pressure. The ever-accelerating news cycle has increased 'quick & dirty' reporting, and this development is exacerbated by the budget cuts that have struck many science desks. This, in turn, has led to expertise becoming scarcer, at a time when hyperspecialization in science necessitates the opposite. Mistakes in communicating science to the public are an inevitable result of these developments. These mistakes, combined with the apparent cavalier attitude of certain politicians towards (scientific) facts, have caused a new journalistic genre to emerge: the science fact check.

By evaluating the accuracy of science-based claims, fact-checkers are able to correct inaccurate representations of science using substantiated considerations. Through the resulting fact checks, the public can expand their knowledge of how scientific processes and practices work. More importantly, they are exposed to critical thinking about these processes and about the way in which these are communicated in the media. In this sense, science fact checks represent a potentially influential new tool in developing scientific literacy. However, to understand this possible influence, we have to study the science fact check as a genre.

For this presentation, we perform qualitative and quantitative content analyses of almost 2,000 fact checks from Dutch print media. We examine which types of claims are fact-checked and which scientific disciplines they stem from. We also investigate which pitfalls in science-public communication are remarked on most (e.g. causation, validity, presentation). Preliminary results show a focus on claims related to health, food, and climate matters, and a predilection for checking number-based statements. At the conference, we will report more on this ongoing investigation. Our findings can inform practitioners, researchers, and members of the public about the promises and problems of current science communication.

Marten van der Meulen
Radboud University, Netherlands

942 Roundtable discussion

Miles away and we still have a lot in common: the origins of modern science communication in Ibero-America

Gema Revuelta
Studies Center of Science, Communication and Society and Master of Science, Health and Environmental Communication (Pompeu Fabra University), Spain

For centuries, common language made it easier for Spain and Latin American countries to share stories in the media. This has increased in the current era, since digital media in Spanish have a wide spread throughout the Spanish-speaking world, regardless of the country where it originated. The same could be said of Portugal and Brazil, with their common language. The language is clearly a common link that unites communication in geographically remote countries, but it is not the only link that unites Ibero-American countries.

Science communication in Portugal and Spain is, in many cases, closer to that of countries such as Brazil, Colombia or Mexico, than that of many of the countries belonging to the European Union, closer geographically, monetarily and politically. Ibero-America is not a geographical concept (the distance between some countries exceeds 12.600 miles!) but a concept that has a lot to do with language and culture, as well as with history. The birth of modern science communication in the different countries that make up this conceptual region holds many elements in common, many personal stories of communication pioneers who exercised their influence in other countries, of professional associations that served as reference to others, of publications with international authors etc.

This panel explains the convergences and divergences in the origins of the modern science communication of five Ibero-American countries: Brazil, Colombia, Mexico, Portugal and Spain. It will start by presenting a combined timeline of milestones and close with an outlook into the challenges and possibilities for the region.The four speakers proposed for this panel and the two co-chairs represent a group of 18 authors, who have written the chapters of their countries in the joint work for a book on the history of modern science communication in the world, edited by Toss Gascoigne and published by ANUPress in 2020.

Luisa Massarani
National Institute of Public Communication of Science and Technology-Brazil, Brazil

Sandra Daza-Caicedo
Independent researcher, expert in Social Appropriation of Science, Technology and Innovation, Colombia

Elaine Reynoso Haynes
Dirección General de divulgación de la ciencia, Universidad Nacional Autónoma de México, Mexico

1069 Insight talk

The Who, What, Why of Science Communication Education in the UK and How it impacts Science Communication

Samuel Ridgeway
UWE Bristol, United Kingdom

A Review of the Enrolment in and Perceptions of formal Science Communication Education in the UK:

Science Communication (SciComm) continues to grow as an industry. Specialised SciComm Masters and other formal education programmes have been developed to teach students and researchers best practice in communicating science and help progress their careers. New research carried out in 2019 reports on the results of a national survey of 167 science communicators, including 93 SciComm MSc alumni, and interviews of 6 programme leaders from various SciComm MSc programmes in the UK. The quantitative and qualitative analysis provides insight into possible issues of inclusivity and the motives of both the education programmes and those who participate in them.

Examples of key points highlighted in the discussion include:
- The career-driven nature of SciComm education (90% of SciComm MSc alumni enrolled in order to improve career and employment opportunities)
- Demographics of qualified science communicators (70% female enrolment in SciComm MSc programmes, vast majority of students identify ethnically as White British)
- The skills and themes learned (for example networking, considering audiences, and media production)
- Accessibility of training
- Perceptions of the relationship between SciComm and science

The research draws on themes from international studies of the purposes and perceptions of SciComm training whilst also potentially serving as a blueprint for future international data collection to address formal SciComm education and university alumni. This talk is particularly important as those who seek and complete SciComm training often go on to have careers in the field, it is important to understand their perceptions and skills that will ultimately define SciComm in the coming years. By providing an outlook on the state of SciComm education, the talk allows for greater understanding and dialogue of how training can better serve the SciComm community and the audiences we aim to reach.

881 Insight talk

How an Online Parenting Website Will Help Us Fix the Fake News Crisis

Andy Ridgway
University of the West of England, Bristol, United Kingdom

An online parenting website may not seem like the most obvious place to find solutions to the fake science news crisis. But the website's discussion forum provides useful insights how decisions are made about what is trusted online - a key aspect of the fake news problem. Here early results from a study of forum posts on the parenting website will be presented. The posts provide an indication of the types of information, in terms of its source and content, that are trusted by forum members.

One thing is clear. Traditional indicators of the credibility of information commonly used in science communication practice are not being employed to make decisions by forum users on what they trust. Instead, something else entirely appears to be happening. What makes this particularly interesting is that the information the parents are reading on the forum often relates to something of central importance to them – the health of their children.

While some of the findings of this research will be a cause for concern for those involved in science communication practice and society more broadly in this age of democratized information provision, they also point towards some practical solutions to the challenge of fake news.

The research uses a Social Practice Theory perspective and the forum posts were coded and analysed quantitatively and qualitatively. The results presented will show the nature of the online interactions and what they highlight about trust. The results demonstrate the increasing need to form a sense of genuine connection with audiences and participants in conversations about science - connections forged through shared experience. So how can those engaged in science communication, both as individuals and institutions, forge authentic connections so that it is their voices that are heard rather than the purveyors of fake news?

Andy Ridgway
Science Communication Unit, University of the West of England,

1117 Individual paper

Revisiting MythBusters: Television, Time, and the Ongoing Story of Science

Ben Riggs
Northwestern University, United States

In the early 21st Century, science on television has perhaps been most exemplified by the procedural reality series MythBusters. Produced by Australia's Beyond Television Productions and distributed globally by the Discovery Channel, MythBusters has been routinely celebrated in public for its engaging presentation of scientific protocol, where the testing of an individual "myth" within an episode is said to positively demonstrate scientific methods (e.g., Schwarz, 2006; Heritage, 2015). The popularity of MythBusters suggests that television remains an important venue for communicating science to the public, despite "frequent criticism […] of the way science is represented" on TV (Hook & Brake, 2010, p. 33). While acknowledging these criticisms, this paper argues that MythBusters, which produced over 250 episodes during its original series run (2003-2016), actually presented a fuller, more nuanced vision of science than at first glance, by embracing the complex narrative seriality which typifies much of the contemporary fiction (non-scientific) TV landscape (Mittell, 2015).

In the MythBusters lexicon, a "revisit" is when series hosts reengineer and reevaluate previously-tested myths with new techniques or testing conditions. Drawing from recent work in the humanities-based field of television studies, this paper makes the case that the revisit resists the linearity and boundedness of a single scientific test by both calling back to previous episodes and by suggesting that future tests could yield alternative results. In other words, a regular viewer of MythBusters, who understands its protocols as a television series, would see that science is ongoing, subject to replication and revision, and self-correcting. Thus, by considering how the "representation" of science—and the scientific enterprise itself—may be defined temporally, this paper argues that a media technology like television, which delivers serialized, ongoing stories, is uniquely able to represent science as happening over time—a feature heretofore under-scrutinized in science communication scholarship.

740 Demonstration

How images can hinder or boost the dissemination of your research.

Cristina Rigutto
University of Trento, Italy

As social media and mobile technologies have advanced, communication has evolved to become increasingly more visual and led to a transformation in the editorial practices. These practices need to be addressed by transforming the relationship between science communication practitioners and researchers so that for both the use of visuals will become an aid and not a limit for communication and promotion of research.

Nowadays, researchers frequently communicate about their research on social media, online newspapers or journals blogs, and they include or are requested to provide a related picture to catch audiences' attention. However, not any image is relevant, easy to understand, suited for the platform where is shared, and/or copyrights free. Moreover, if researchers do not provide a picture, the social media editor could choose one that is appealing but contradicts or misinterprets the research findings or deviates the attention from the key message.

Researchers do not only communicate about research using pictures but charts as well. They need to represent the data objectively, but they tend to produce charts with too many layers of complexity. On the other hand, social media editors and communication practitioners give priority to the aesthetic over scientific accuracy and, to make charts catchy, they sometimes do not represent the information properly. Either way, those charts are frequently too complex or too simple and can unintentionally misrepresent data or convey bias that often leads to misinformation.

It has become increasingly important to go beyond scientific images, and design images of science that combine the needs of the editor to promote the article through compelling visuals and that of the researchers to maintain scientific rigour. In this demonstration, we will suggest practical solutions to communicate about research visually by combining the perspectives of a researcher and a Journal social media editor.

Elena Milani
University of West England, United Kingdom

847 Linked papers

Science never speaks for itself: Transforming perspectives on the communication of science, belief and society

James Riley
University of Birmingham, United Kingdom

Science never speaks for itself, rather its communication is undergirded by sets of often-unspoken beliefs. This multidisciplinary session draws upon sociological, psychological, historical and media studies approaches to interrogate issues in the communication of the relations between science, belief and society. The issues discussed in this session include the singular focus on creationists in press discourse around attitudes to evolution, the effects of Richard Dawkins' anti-religious statements on religiosity and science identification, the changing institutional forces shaping the versions of science which have appeared on the BBC, and how imagined audiences shape both ‘religious’ and ‘secular’ representations of science on British television. The thematic link between these papers is that science never ‘speaks for itself’. Institutions and individuals’ beliefs shape the versions of science communicated to the public, and thus also frame how that version of science can and does relate to society. Accordingly, the papers in this session focus on both the changing institutional forces that shape the versions of science and science-society relations communicated to publics, as well as the effects of ideologically-framed messages on individuals’ identification with science.

Following the presentation of the linked papers, chair Professor Fern-Elsdon Baker will lead a discussion linking the themes of the papers, placing the arguments in a broader international context of issues relating to science, belief, and society.

Exposure to public anti-religious statements results in lower identification with science, but not reduced religiosity among religious individuals

Carissa Sharp
University of Birmingham, United Kingdom

Co-Authors: Dr Carissa Sharp, University of Birmingham (C.Sharp@bham.ac.uk) Dr Carola Leicht, University of Kent (A.C.Leicht-23@kent.ac.uk) Atheist public figure and scientist, Richard Dawkins, has been a major public figure in the communication of science for decades. We investigated how people with different religious identities are affected by anti-religious arguments expressed by Dawkins. Specifically, we examined whether confrontational anti-religious statements reduce religious beliefs and result in negative attitudes towards science. In Experiment 1, religious individuals did not report less religiosity after being exposed to such statements. In Experiment 2, we found that religious people identified less with science after being presented with a confrontational passage as compared to a non-confrontational one. In turn, atheists were less able to reconcile evolutionary science with their personal beliefs when exposed to a less confrontational statement as opposed to no statement at all. Only participants who identified as non-religious but not atheist reported believing less in God or higher power. Our studies show that hostile anti-religious statements do not convince religious people to become less religious. However, such passages discourage religious people from identifying and possibly engaging with science in general.

Who gets to speak for science? Contestations over science broadcasting at the BBC

Alexander Hall
University of Birmingham, United Kingdom

In 1949 the newest member of the BBC General Advisory Council, the physicist Mark Oliphant lamented, “I would like to see some break-away from the perpetual theme of ‘science and society’, with the inevitable excursions of the scientist into fields of politics where he does not shine, towards an attempt to present science as natural philosophy.” Oliphant’s complaint led to a review of the content of science broadcasting at the BBC, and the appointment of the former President of the Royal Society Sir Henry Dale, in a short-lived role as BBC Science Adviser from 1950-52. This episode was just one in a series of post-war contestations between the BBC, senior British scientists, and organisations such as the Royal Society and the British Association for the Advancement of Science, on who should control the content and approach to science broadcasting in the UK. Since the 1930s, alongside more pedagogical educational content, the BBC had developed a style of radio broadcasts, which discussed science and society. Focused on the application of cutting-edge science, and associated controversies, many felt that this approach overshadowed the more pressing need for broadcasting to educate and improve the general populace’s science literacy. After outlining the various episodes that

contested the boundary and autonomy of science broadcasts in the period, the paper will finish with the launch in 1964 of the long running science show Horizon, which cemented the science and society approach at the heart of the BBC’s burgeoning television output. In reflecting on these contestations, the paper explores the emergence of professionalised science communicators working in broadcasting, and asks whether any legacy can be found in the structure, format and style of science broadcasting today.

Stephen Jones
University of Birmingham, United Kingdom

985 Visual presentation

A Walk Through Time: South African Science Lens Competition

Joanne Riley
South African Agency for Science and Technology Advancement, South Africa

The South African Science LensTM exhibition is a collection of photographs that capture the science behind the beauty in our universe and the beauty we discover through scientific investigation. Many of the photographers are researchers or science students across numerous disciplines including biology, chemistry, physics, geology and astronomy. Others are amateur or professional photographers from all walks of life that are interested in the scientific world. This collection of images has been produced with cameras, microscopes and telescopes using various techniques. The photographs are entered into the biennial SA Science LensTM competition, an initiative of the South African Agency for Science and Technology Advancement, a business unit of the National Research Foundation. The competition has been running since 2002 and consists of four different categories: Science as Art, Science Close-Up, Science in Action, and a category that changes with each competition to reflect a particular theme relevant at the time. The images from this competition are as varied as they are beautiful: some look like abstract paintings, and others like peaceful landscapes – but all are as valuable to science as they are to art. This visual poster presentation will provide a feature of the SA Science LensTM competition over many years and a walk through time of a well-established science communication initiative.

749 Roundtable discussion

Can Novelty be Responsible? A Conversation on Science Communication and RRI

Tara Roberson
University of Queensland, Australia

The futures promised by emerging technoscientific developments are framed as disruptive and powerful with applications in wide-ranging areas. Responsible research and innovation (RRI) offers one approach for engaging in conversation around these promises and opening up their presuppositions to scrutiny. For example, the economic, societal, and other benefits of emerging technoscience are uncertain. While the challenge for technoscientific researchers may seem purely technological (how do we realise new technologies?), there are also social and political questions (how do we engage publics in dialogue on new developments when we don't know what they do or when they will be built? What kinds of social worlds do they enact and how desirable are these?).

Science communication can animate RRI conversations in new ways by exploring how we imagine novelty and its normative significance. This is urgently needed as RRI is often re-interpreted as a way of describing some well-established practices (e.g., risk regulation of new technologies, research integrity and so on) despite efforts by RRI proponents to clarify its distinctive focus on innovation 'systems'. Understood as risk regulation of technological change, RRI is conventionally framed as a way of slowing down innovation or novelty by attending to ethical matters and unintended consequences.

Yet, RRI might also be understood differently as a way of promoting novelty. For example, 'responsible stagnation' requires distinct types of novel social, economic, cultural and technological practices. Remaking research practices and their relationship to publics likewise represents novelty as does the effort to attend to the creation of social change in response to 'grand societal challenges'. In this roundtable, participants will explore what science communication might contribute to re-constructing narratives of RRI and re-imagining its relationship to more or less responsible forms of novelty.

Maja Horst
Technical University of Denmark, Denmark

Fabien Medvecky
University of Otago, New Zealand

Sujatha Raman
Australian National University, Australia

Alan Irwin
Copenhagen Business School, Denmark

892 Visual presentation

Frame Up: Analyzing Media Frames of News Placements on Industry, Energy and Emerging Technology Research Projects in the Philippines

Mark Ivan Roblas
Department of Science and Technology - Philippine Council for Industry, Energy and Emerging Technology Research and Development, Philippines

Communicating science in the Philippines remains a challenge as awareness of science remains at a low. Despite constant and consistent efforts of the Philippines' Department of Science and Technology in intensifying science communication through media relations, awareness of science and technology in the news is at 15%. This poses a challenge for science communicators in the Philippines as they attempt to impart the importance of communicating scientific breakthroughs in the country and how it affects their lives.

The paper presents an analysis of news placements for the year 2019 vis a vis news releases of one of its sectoral planning council, the DOST Philippine Council of Industry, Energy and Emerging Technology Research and Development. As science news covers different areas (i.e. scientific services, recognition of scientists, etc.), the paper examines news coverage on press releases that highlight results of researches that are funded by government. It compares government framing and media framing of news about research outputs, showing the dominant frames that can help science communicators in increasing chances of getting media coverage for their research outputs.

589 Insight talk

Integrated STEAM approaches for communicating science in informal learning environments

Joseph Roche
Trinity College Dublin, Ireland, Ireland

Integrating art and science is a process that is often described as “STEAM”, which is the addition of the arts to the more well-known STEM acronym (where STEM stands for Science, Technology, Engineering and Mathematics). The STEAM movement has seen researchers and practitioners in both science communication and science education wrestle with the strengths and weaknesses of this approach both in terms of communication and pedagogy. During this practice insight talk, learnings will be shared from a “Science Learning+” project — an international initiative between the National Science Foundation in the US, the Wellcome Trust, and the Economic and Social Research Council in the UK, with the goal of furthering research in informal learning environments. This five-year project pairs researchers with practitioners to explore how six informal learning programmes, in the US, the UK, and Ireland, utilise an integrated STEAM approach to communicate science in the hope of creating transformative experiences for young people, particularly those from low-income and under-represented communities. This talk will focus on the epistemic intersections between art and science that may operate to broaden appeal and expand opportunities for meaningful science communication in informal learning environments. The audience will be invited to share their views on whether such STEAM approaches might have a meaningful role in the future of science communication.

Mairéad Hurley
Science Gallery Dublin, Ireland

Sam Mejias
London School of Economics, United Kingdom

Nancy Price
University of Washington, United States

Philip Bell
University of Washington, United States

738 Individual paper

Structures of engagement: How institutional structures at U.S. land-grant universities impact science faculty public engagement

Kathleen Rose
Dartmouth College, United States

With growing calls for increased science communication efforts, much discussion has focused on the reasons behind why some scientists choose to participate while others do not and the factors that may influence these decisions. Research over the past few years has addressed many individual-level factors that encourage participation in science communication and engagement efforts, ranging from career status to personal motivations and perceived self-efficacy. Yet, these individual-level factors do not address the larger context in which scientists are often situated, the priorities, decisions, and infrastructure at the university level. Science communication researchers and practitioners have suggested that certain institutional structures, such as an unsupportive university culture or lack of tangible rewards (e.g., during the tenure process), may suppress communication efforts. Little empirical research, however, has systematically addressed these structural factors that may encourage or discourage involvement in public science engagement.

To ground recent discussions about potentially restructuring faculty expectations and reinvesting in support for service at public universities as a way to encourage greater science communication efforts, we explore structural factors that impact public science engagement at land-grant universities across the United States.

Using data from a 2018 census survey of science faculty members at 46 land-grant universities across the U.S. (N=8,235 eligible completes; RR2=14.1%), we use hierarchical linear modeling analysis to explore how institutional structures within these universities affect the science engagement activities of their science faculty members. Structural factors can include those related to the tenure review process (e.g., importance of engagement for tenure), university support (e.g., presence of offices of outreach and engagement; engagement awards), and the attention called to engagement and outreach activities by these universities (e.g., presence in university mission statements; press releases). We end with a discussion of how these institutional structures might impact the future of science communication.

Luye Bao
University of Wisconsin-Madison, United States

Dominique Brossard
University of Wisconsin-Madison, United States

Ezra Markowitz
University of Massachusetts Amherst, United States

977 Insight talk

Integrating new technology and local practice in designing a communication tool

M.E. Rottink
Technical University of Delft, Netherlands

Climate change is one of the biggest issues of the 21st century and impacts different parts of the world to a different extent. Developing countries are especially vulnerable and need help to increase their adaptive capacity to better cope, adapt or recover from different natural hazards.

São Tomé is a small island in front of Gabon, with an increasing risk of coastal flooding. It is important for the local coastal community to know how high the water is going to be in case of an imminent flooding, so that all parties can take appropriate action. In order to achieve this, first a model is required to calculate how high the water will get. In addition, the different parties involved must be able to receive all relevant information in time and to interpret it properly.

The research has focused both on the technical and the communication aspect of coastal flooding. A new hydraulic model was developed that can be used to calculate the expected flood extent and height linked to forecasts for the coming days. In addition, the social system for the island of São Tomé has been mapped out using a newly developed method. This resulted in an overview of the different parties involved in coastal flood events, their information needs and expertise, and the communication means they have available. This overview was subsequently used to design a visual communication tool, based on the hydraulic model, in which relevant data is immediately available to the different parties.

By integrating technical innovation and communication design, a tool was made that can be incorporated into the daily practice of São Tomé and increases its adaptive capacity to coastal flood events.

Caroline Wehrmann
Technical University of Delft, Netherlands

649 Individual paper

Evidence for gendered engagement with posts authored by women scientists in social media

Yael Rozenblum
Technion, Israel

Women are underrepresented in STEM fields, such as physics, and popular media representations of female scientists tend to be lower ranked, emphasizing “feminine’ qualities rather than professional achievements (Chimba & Kitzinger, 2009). This study aims to characterize gendered patterns of public engagement on social networks - one of the most powerful science meditation agents today, asking whether there are different patterns of audience engagement with posts authored by female and male scientists on a popular science Facebook page.

Facebook is the largest social media platform in Israel and Little, Big Science (LBS) is the largest independent Facebook page for popular science in Hebrew, with more than 130,000 followers. We collected 166 posts published between 2016-2018 and written by either a female (n=6) or male scientist (n=10). All 10,066 comments to these posts were extracted for analysis. Analysis followed 2-steps: first coding the posts and then the comments. Coding was done by two research assistants and included satisfactory inter-coder reliability measures. Codebook was based on Amarasekara and Grant’s (2018) work and included categories such as hostile or positive attitude towards the post writer, text or Facebook page, relevance to the topic of the post and more. Chi Square test was used for statistical analysis.

Significant differences were found in both the relevence and the sentiment of the comments: (1) More comments to female scientists were categorized as not relevant to the topic of the post; (2) Female scientists receive more positive, hostile and advices on how to write better, and less neutral comments than males.

Our findings echo the literature on “Mansplaining”, in which males explain to females on the assumption that they are more proficient than females on the subject (Koc-Michalska et al, 2019).

Keren Dalyot
Technion, Israel

Ella Lachman
University of California Berkeley, Little Big Science, United States

Ayelet Baram-Tsabari
Technion, Israel

785 Insight talk

"Doing it to tick a box is an insult to everybody": Reflecting on participatory practices across Europe in Fisheries Science

Simone Rödder
University of Hamburg, Germany

Since the ‘participatory turn’, public participation in research is conceptualised as a social as well as an epistemic value and participatory elements are increasingly required to succeed in national as well as European funding schemes. With increased participation, knowledge production is expected to change from exclusive to inclusive and from esoteric to ‘socially robust’ and sustainable. These participatory practices, however, await investigation: What concepts of ‘research’ and ‘knowledge’ do the different approaches embody? In how far are different kinds of expertise acknowledged? What relationships develop between experts, communities and policymakers? Where is the line between empowerment and exploitation? Moreover: Do these practices challenge or rather support implicit communication models such as the deficit model?

In this contribution, we aim at advancing ‘research for all’ by both theorising participatory science and its underlying values and by exploring how participation plays out in practice. Our empirical case is fisheries science, an applied field that by way of assessing fish stocks provides policy and management advice. The field’s key stakeholders are fisheries scientists, fishers, fisheries managers, representatives of the industry, and local and EU policy and governance agencies. Whilst the views of stakeholders on engagement in fisheries science are fairly well researched, there is a gap in our understanding of the rationale and motivations of the scientists who engage. We therefore specifically look at how fisheries scientists’ perceive their engagement with other stakeholders and compare engagement practices in five case study regions across Europe, including the Mediterranean Sea, the Bay of Biscay, the North Sea, the North-western European Shelf and the Eastern Baltic Sea. The talk will present findings based on 25 interviews with scientists in the case study regions.

Vera Köpsel
University of Hamburg, Germany

806 Visual presentation

Global Warming in Local Discourses: How Communities around the World Make Sense of Climate Change

Simone Rödder
University of Hamburg, Germany

The concept of anthropogenic climate change has sparked extensive discourses in science, politics and the public sphere. Unlike many other scientific issues, the global warming debate features strong transnational actors and institutions such as the Intergovernmental Panel on Climate Change, the United Nations' climate summits, environmental NGO networks and climate denial by vested interests. Yet global warming, defined as long-term changes in global average temperatures, "is not perceptible nor provable as a day or year of human life shade into the next" (Jasanoff 2010). In making sense of climate change, individuals entangle the scientific concept of climate with their everyday lifes where it is shaped, for instance, by experiences of extreme weather events or seasonal change.

In this visual presentation we make a case for understanding the dynamics of how individuals make sense of climate change. We base our presentation on case studies of local communities around the world that represent a range of cultural and geographical contexts, including coastal regions in Western countries (Germany) as well as South-East Asia (Philippines, Bangladesh), Central Africa (Tanzania) and Greenland. Our contribution will explore how climate-related interpretations evolve in each of these regions.

Joana Kollert
Universität Hamburg, Germany

Michael Brí¼ggemann
Universität Hamburg, Germany

780 Individual paper

Exploring reflexivity: building bridges between theory and practice in science communication

Rhian Salmon
Victoria University of Wellington, NZ, New Zealand

Over the last decade, science communication has shifted away from ‘pop outreach’, towards more strategic, deliberative approaches. However, many scientist-communicators still lack the support, training and professional recognition required to design effective and theoretically-informed engagement.

The authors of this paper are both public engagement practitioners and researchers. We will present how we have explored bridging the theory-practice divide in a number of science communication case studies in Aotearoa New Zealand. This includes engagement about national research programmes on climate change, complexity, and sea level rise; and a series of festivals that celebrate mathematics and mathematical thinking through the medium of craft.

This research explores the practical challenges of putting engagement theory into practice, building on two papers that propose that an increase in reflexivity on the part of science communicators could change the focus of public engagement with science (Salmon et al. (2017), Salmon & Roop (2019)). We have experimented with different, consciously designed engagement devices that are used to change the way a practitioner thinks about and delivers their communication and engagement. This ranges from exercises using cardboard prototypes and drawing exercises; to an activity that interrogates the power structures and implicit assumptions behind a given initiative; to designed installations at conferences seeking to elicit insights into participants’ thoughts, hopes, and fears.

We argue that by continually interrogating our theoretical approach to public engagement, while also having very real associated funding, responsibility, deliverables and deadlines, we have been contributing to building bridges between science communication practice and research in Aotearoa New Zealand. This has been demonstrated by changes to the annual national science communication conference; integration of engagement at a senior level across national research programmes; and the inclusion of an Engagement Incubator in a new funding proposal for a national Centre for Research Excellence.

Jo Bailey
Victoria University of Wellington, New Zealand

627 Insight talk

Changing aspects of science as a cultural endeavour.

Nigel Sanitt
Pantaneto Press, United Kingdom

As an intellectual and practical pursuit, science is part of our culture. It is inexorably tied in with our history, literature, art, politics, economics, education and ethics. These are all, in turn, part of human communication and our social fabric.

Many aspects of research activity, especially in the physical sciences, are opaque to outsiders and this opacity infects how connections are made between science and other disciplines.

There has been a growing realisation over recent years that the prophetic warning of Vannevar Bush in 1945:

“It would be folly to set up a program under which research in the natural sciences and medicine was expanded at the cost of the social sciences, humanities and other studies so essential to national well-being”

Is ignored not just to the detriment of society at large, but also to science itself.

The relationship between science and the arts and humanities is undergoing a radical rethink at the present time amongst scientists.

In this talk and visual presentation, I analyse these issues in terms of 1) the meaning of scientific language and the networks of questions that scientists form to create ideas 2) the changing aspects of what part the arts and humanities inform science as a cultural endeavour 3) In dealing with a subject, which has been discussed by many since 1945 and earlier times, I drive through the complexity by a) bridging the gap between how scientists, as well as sociologists, view science and b) show how these various viewpoints relate to the perception of science and its communication to the public.

I expand and explain these ideas in relation to my book: “Culture, Curiosity and Communication in Scientific Discovery: The Eye in Ideas”, which has just been published by Routledge.

674 Visual presentation

Science in Brazilian and Canadian Pubs: Public Communication of Science Initiatives at Pint of Science in Brazil (Uberlandia) and Canada (Ottawa).

Adriana Santos
Federal University of UberlÃ¢ndia, Brazil, Brazil

The text, which brings partial results from postdoctoral research, discusses the public communication of science, with emphasis on science dissemination initiatives and its interaction with academic production. Therefore, it studies the public communication of science (PCS) and the fact that the ideal model of PCS goes beyond the dissemination process, seeking an interaction of the public with the process of knowledge construction, as it develops an understanding of reality and daily problems in the most various social sectors. The study uses the dissemination of science in society by the Pint of Science event. Pint of Science is an international event aimed at interesting, entertaining and relevant debates about the latest scientific research in a public and accessible format. It was first organized in 2013 in England and spread to different countries. In 2018 it occurred in 400 cities around the world, and in that year, in Brazil, it occurred in 56 cities, involving various educational and research institutions, including the Federal University of Uberlândia, in Uberlândia, Minas Gerais. In Canada, the event took place in 15 cities and involved several institutions, including the University of Ottawa, the country's capital. Therefore, it is an entrepreneurial event of scientific dissemination, which grows more and more, with activities aimed at bringing the production of academic knowledge closer to the social reality of the places/countries where it takes place, contributing to the national culture and integration among students, teachers, researchers and the community at large. Through the results disclosed by images, we will show that in both Brazil and Canada, in the analyzed editions of the event, the presentation forms resemble classes, without any engagement, and the public is still very restricted to other researchers and students and not necessarily to society in general.

Keywords: Public Communication, Scientific Culture, Pint of Science.

Antonio Carlos Santos
Federal University of Uberlândia, Brazil

Mirna Tonus
Federal University of Uberlândia, Brazil

916 Visual presentation

Portuguese students' perceptions of science and scientists: a case study in a Ciência Viva school

Ana Santos-Carvalho
University of Coimbra, Institute for Interdisciplinary Research & CNC -Center for Neuroscience and Cell Biology, , Portugal

The main goal of this paper is to report the preliminary results of a qualitative study on the representations of Science of 60 children between 8-11 years old (K1 - K4), in order to better understand what are the perceptions of these Portuguese students about science, and in what ways do they represent themselves as little scientists.

Methodologically, we have used a modified version of the DAST-C test (Draw-a-Scientist Test Checklist), as well as the children's description of their own drawings. This study was carried out throughout the evaluation process of the Advanced Courses of Experimental Sciences (ACES) that was carried out by the Institute of Education and Citizenship (IEC). We have made a quantitative and qualitative analysis of children’s draws. In agreement with other national and international studies on this field, the results of this study show that students represent a stereotyped image of science and themselves as scientists. Those images are influenced by experiences inside and outside school. As revealed by other studies the impact of teachers and textbooks has shaped what a scientist should look like and how scientists should behave in the laboratory. In this regard, scientists are drawn in lab coats, indoors, working by themselves, and surrounded by symbols of secrecy and mysticism.

We propose that the studied science courses must include elements, practices, and contexts that may encourage children to deconstruct the role and the profile of scientists in society, such as implementing more collaborative practices inside the laboratory; broadening the profile of the scientist (e.g. social scientists); expanding the scientific plateau towards outside the laboratory. We believe that only a deep understanding of this topic will enable teachers, researchers, parents, and policymakers to develop tools to support children and young people to take a disruptive and critical scientific role in Portugal.

Denise Esteves
Centre for Social Estudies & Institute for Interdisciplinar Research, University of Coimbra, Portugal

1152 Individual paper

(Re)Turn to trusted experts and traditional media? Communication behaviour and science attitudes during the pandemic in Germany, Italy and Sweden

Barbara Saracino
University of Bologna, Italy

The novel coronavirus pandemic challenged all aspects of societal life in spring 2020. Research resources and communication efforts were mobilised worldwide in order to help reducing the harmful effects of the disease. In this global emergency, policymakers and authorities but also common citizens were faced with making daily decisions based on a growing, but limited evidence base.

When the need for correct and up-to-date information is acute, communication has a crucial role. But in times when information channels abound with a variety of – often conflicting – advice, the question of whom to trust becomes central.

Against this background, several public attitudes surveys were conducted in different national settings to explore questions such as: Which sources does the general public use to get information about the virus and the disease? What confidence do they have in various types of spokespeople? What are their perceptions of scientists speaking up about corona?

In this paper, we will present and compare public perceptions on the communication of the covid-19 pandemic from Germany, Italy and Sweden. The insights are based on public attitudes surveys conducted during the outbreak of the pandemic. The topics covered include information sources as well as the view on scientists and spokespeople.

Gustav Bohlin
Vetenskap & Allmänhet, Sweden

Massiminao Bucchi
Università di Trento, Italy

Ricarda Ziegler
Wissenschaft im Dialog, Germany

622 Insight talk

Transforming tradition: evaluating the iconic Christmas Lectures series

Margarida Sardo
University of the West of England, Bristol, United Kingdom

The Christmas Lectures are an internationally known landmark of the Science Communication landscape, and one of the earliest examples of scientists engaging with the public with institutional backing. Physicist Michael Faraday initiated this series that has run at the Royal Institution of Great Britain, in the UK, since 1825, without interruption except World War II. The series, televised annually for the past 50 years, has included presenters such as David Attenborough, Carl Sagan and Richard Dawkins. A centrepiece of the national conversation about the place of science in our lives, the lectures are now designed to be engaging and mind-expanding viewing for people of all ages but particularly children.

In this paper we present research we have conducted to explore strengths and opportunities for improving and modernising the Christmas Lectures. In our 18 month evaluation we have used a variety of methods to collect data, such as semi-structured interviews, online surveys, structured observations and feedback cards. We have found evidence suggesting that the Christmas Lectures are still very much a family tradition in the UK, amongst those who self-identify as “science enthusiasts”. The audience reported their enjoyment of the shows, in particular the engaging and interactive demonstrations.

With viewers changing their habits and how they watch TV/consume video material, we argue the Ri should re-evaluate its target audience, as it is not clear who the lectures are aimed at. In addition, the Ri should consider cutting down the lectures into short video clips which can be viewed on social media or YouTube, as this is how young people consume video material.

A full evaluation was conducted and in this presentation we will share our findings and explore how the Royal Institution can modernise the iconic Christmas Lectures.

Hannah Little
University of the West of England, Bristol, United Kingdom

Laura Fogg Rogers
University of the West of England, Bristol, United Kingdom

846 Individual paper

Transforming science communication at Informal Learning Institutions: Using collections and evaluation to tell the story of science and expertise

Sarah Sargent
Morton Arboretum, United States

Using collections held at Informal Learning Institutions (ILI) to communicate science poses a unique set of challenges and opportunities. A study conducted throughout the United States, showed that ILI such as museums or botanical gardens rank as trusted sources of science expertise, yet, the public does not rely on ILI as a primary source of scientific information. ILI are uniquely positioned to communicate science through collections, both through conducting research and serving as destinations to millions of visitors each year. In order to bridge this gap between expertise and the public, these institutions must improve their efforts to make their science content and collections resonate with their audiences, and to be seen as leaders in original research. The Morton Arboretum outside of Chicago, IL USA, is an outdoor living tree museum that is working to connect its visitors (>1 million per year) to its research and expertise.

The latest permanent exhibition at the Arboretum, the Gateway to Tree Science, introduces visitors to tree science through growing and ever-changing displays showing the effects tree care choices over time. The exhibition concept depends on successful science communication; the Arboretum engaged in an external audience research firm to support this exhibition's development and understand its impact. This presentation explores how and why an institution prioritizes its expertise, the role of audience research in developing and evaluating exhibitions, the importance of incorporating communication strategy to inform experiential learning, and the impact of the exhibition and its content on visitors. The Arboretum is transforming ongoing research and a physical space into a public resource that serves visitors, informed through the evaluation of its audiences’ needs and knowledge. The practices and principles of transforming science communication discussed in these linked papers can apply to all ILI, beyond those with living collections.

908 Demonstration

Active learning in the science communication classroom

Mark Sarvary
Cornell University, United States

Teaching science communication can happen in many different formats: one-day-long workshops, activities embedded into science courses or semester-long courses dedicated only to communication. Regardless of the format, the science communication classroom is transforming, following the newest trends in education research. With the advancement of education research, it is clear to all instructors that students learn better by doing, and science communication has many applied components that can be taught using these active learning techniques. In this demonstration, the co-presenters want to share some of the active learning techniques they have been using the past years in their applied science communication course at Cornell University and at Shoals Marine Laboratory. Ideas about how to teach information literacy, encourage storytelling, assess audiences or use social media will be shared. They will also discuss curriculum development using Bloom's Taxonomy. Attendees are encouraged to bring their own teaching techniques to share and help build an “inventory” of active learning methods that instructors who teach science communication can use. The focus of this demonstration will be hands-on activities. Attendees will walk away with this “inventory” that they can implement into their own classes and workshops.

Mark Sarvary is an instructor in biology and science communication at Cornell University and conducts discipline-based education research. Kitty Gifford is an independent communication consultant and brings her real-life experience of working with clients into the classroom. They co-teach a course titled “Applied Science Communication: digital platforms and public engagement” and have been teaching science communication workshops to undergraduate researchers, postdocs and faculty members at Cornell and at other institutions. They look forward to bringing useful tools to this demonstration and gaining new ideas from the attendees.

Kitty Gifford
Science Communication consultant, United States

853 Roundtable discussion

A Foundation, not an afterthought: diversifying training models to transform science communication education worldwide

Mark Sarvary
Cornell University, United States

Undergraduates are no longer only consumers, but producers of scientific information and are eager to gain skills in communicating their scientific discoveries. Employees and postgraduate programs are showing an increasing interest in undergraduates with advanced communication and similarly transferable interpersonal skills. These needs have transformed the higher education curricula as science communication education is no longer reduced to a postgraduate afterthought, but is rather a foundation of undergraduate science education. Science communication training can help students understand the scientific process, become science-literate, identify the role of research and innovation in their socio-political contexts, and shape their interdisciplinary views.

This diverse international panel is bringing education professionals together to discuss how science communication has been transforming education all over the world. The panelists will showcase examples from the University of Otago in NZ, Rhine-Waal University in Germany, the Centre for the Public Awareness of Science at the Australian National University, and Cornell University in the USA, and identify the pros and cons of embedded, stand-alone, workshop-style, interdisciplinary and other ways of teaching science communication at the undergraduate level. Results from a comprehensive empirical study on science communication degree programs will be also presented, and the audience will have the opportunity to discuss how to transform higher education effectively and systematically so we can respond to the need for well-trained science communicators early in their academic careers. The conversations will be led by two co-chairs: a science communication practitioner and a well-known science communication scholar, and this panel will offer a unique opportunity to bring perspectives together from multiple continents.

Merryn McKinnon
Centre for the Public Awareness of Science, Australian National University, Australia

Alexander Gerber
Rhine-Waal University, Germany and Institute for Science & Innovation Communication (inscico), Germany

Fabien Medvecky
University of Otago, New Zealand

1101 Individual paper

Modes of children engagement in Participatory Science Communication: contexts and identities in media co-production

Marcelo Sato
CHOICES - University of São Paulo, Brazil

This work investigates the ways in which children get involved in Participatory Science Communication actions. We analyzed the co-production of “radio” and “audiovisual” media by researcher and 08-11 year-old children for the project “Reintroduction of vinaceous-breasted parrot in the Araucaria’s Nacional Park, Brazil”, developed in partnership with Espaço Silvestre Institute. Through the theoretical and methodological approaches of Science Communication as Culture (Cultural Studies) and focusing on participatory actions, we aimed to understand the different modes of child participation in activities of media co-production. The data were gathered from audiovisual records of the actions, field notes and co-produced media developed with and by the children (ten episodes of radio stories and two audiovisuals were co-produced). Four main modes of child participation emerged from the analyzed actions: (1) contextualized mode, in which children participate by incorporating elements from their own context (local and/or childhood cultures); (2) symbolic mode, in which children participate in contributing to the construction of the symbolic elements present in the narratives and produced media; (3) technical-aesthetic mode, in which the children participate in the decisions related to the production techniques and (4) identitary mode, in which children participate by building and claiming their identity during the processes of co-production. Although the intention is not to exhaust any and every mode of participation of children in participatory actions of Science Communication, it is considered as an important step in systematizing a dialogue between research and practices in Participatory Science Communication and childhood studies.

Alessandra Bizerra
CHOICES - University of Sà£o Paulo, Brazil

639 Individual paper

Time Travel - between Scientific Fact and Science Fiction. Accounts from a Popular Science Perspective

Mircea Sava
University of Bucharest, Romania

Time travel and journeys to remote places in the Universe have always been preeminent themes of SF literature and SF film, but they are also present in the inventory of the most common topics that are scientifically explained in popular science books and in TV science documentaries. At a first glance, the proximity between the two categories of media formats consists only in the common subject. But if we consider them from the perspective of science communication, we can identify in this transfer of the space-time journey theme a transfer of the functioning mechanisms of popular culture. These mechanisms have become today models of production and consumption for the genres of science communication and not only for the already established popular genres of SF literature or film. This paper aims to analyse the ways in which time travel and journeys to distant places in the Universe are exploited as themes in a series of books and documentaries of popular physics in an effort to explain science at the border with fiction, as an effect of adopting popular culture models in science communication. In Stephen Hawking's A Brief History of Time and Brian Greene's The Elegant Universe, and also in the series of documentaries derived from these popular science books, there is a considerable proportion that the joint themes with SF literature and film have in their construction. This has some implications for the endeavour of the boundary work between science and fiction, in which the producers of popular science engage. Explaining science through fiction produces cracks at the border between the two and proposes a shared territory. At the same time, positioning science near science-fiction highlights the factual poverty of fiction and thus strengthens the boundary between the two.

699 Insight talk

I Am Ocean: Redefining Narrative Ownership in Science Communication

Gianna Savoie
University of Otago, New Zealand

Never before have we had such broad access to information about the ocean, yet as our seas slip into a state of crisis, the public’s grasp of the issues is far from firm. The ocean we "know" represents many things to many people; for some, it is a realm to be feared, for others, it is a resource to be exploited, and yet for others, it’s a home to protect. Drawing on my two-decade tenure as a producer for major science and natural history broadcasters, this insight talk asserts that viewers have been on the receiving end of ocean science narratives "owned" and dictated by select voices which has rendered an incomplete picture. Because of this, there remains a disconnect with the sea that troubles the public’s understanding of the issues affecting it.

In today's rapidly expanding media landscape, we now have the opportunity – and duty -- to communicate the story of the ocean in innovative and inclusive ways. Here I present my effort in creating a platform for the elevation of diverse, indigenous and otherwise underrepresented voices through the establishment of the non-profit organization, the Ocean Media Institute (OMI) which serves to expand the public's understanding of ocean science through the collaborative creation and open distribution of innovative online media.

Drawing on all themes of Time, Technology and Transformation, I will highlight my participatory trans-media initiative, I Am Ocean which appraises the health of various ocean regions through intimate stories of those we rarely hear from, but are intimately tied to each ebb and flow. Only when we as communicators disrupt the notion of "narrative ownership" and turn instead to a shared narrative that embraces local and indigenous perspectives, will we be able to decolonialize science, deepen our understanding and relationship with the sea and invest in its protection.

896 Individual paper

The intrinsinc polysemy of the field of PCST

Bernard Schiele
UQAM Montreal, Canada

This communication will present the results of a discourse analysis of the notions and expressions used by various actors in the PCST field to describe, explain and conceptualize “science communication” practices (in their generic sense), i.e., as they mobilized them as symbolic operators, as a means to position themselves within this specific field and as a means to distinguish this field from all others which also have for object the circulation of scientific knowledges. These expressions have been analyzed at a synchronic level and, when possible, at a diachronic level in order to grasp as much the “transformation” of practices in view of changing circumstances as the reformulations of the discursive device in which these transformations take place (and which they often mobilize as justification). The research underlying this communication rests upon the chapters on the development of “science communication” in forty or so countries invited by Toss Gascoigne to contribute to the book The Emergence of Modern Science Communication (Gascoigne 2020, forthcoming). This research remains largely exploratory, because the authors who answered the call for chapters all interpreted the writing instructions that were given to them. Nevertheless, we can delimit with some certitude the extent of the semantic universe of “science communication”, and this constitutes the object of this communication.

643 Individual paper

Pseudoscience communication in mass media: Science communication emulation or mass media paradigm?

Alexandre Schiele
Hebrew University of Jerusalem, Canada

In the past decade pseudoscience communication, characterized as non-fiction mass media content drawing condemnation from experts in related fields (Feder 2017), has become a fixture of cable television globally, and, more problematically, even of science channels: science communication programs on television account for a fraction of the audience; debunking programs, which purposely deconstruct pseudoscience claims using the scientific method, are few and far between, always in reaction to the most problematic pseudoscience claims in mass media (Lamberts & Grant 2016). Because few analyses of pseudoscience TV documentaries have been conducted (Black 2012; and Loxton 2015), this talk will present a systematic analysis. However, it will not discuss the present situation, but understand its roots by going back to the first instance of a deliberately produced pseudoscience communication series in the United States. Over the course of its original run between 1977 and 1982, the 144 episodes of In Search Of... were broadcast to every American tv set, at a time when there were only four national networks, and were received with much critical acclaim. At the same time ran a U.S. produced science communication series, although only lasting 13 episodes in fall 1980, was also received with much critical acclaim: Cosmos: A Personal Voyage. Both series were rapidly broadcast in other countries, and continue to enjoy reruns globally, becoming models for future series. Positing an audience overlap in 1980 United States, this talk will present the results of a systematic media analysis of the similarities and differences of topics, formats, narrative strategies, participants... to determine whether pseudoscience and science communication series follow different paradigms or constitute a single paradigm. This talk will demonstrate the existence of a paradigm governing (pseudo)science TV documentaries, and offer recommendations to improve the science TV documentary format, and limit its use for pseudoscience communication purposes.

644 Insight talk

Extra! Extra! UFOs Are Real! From Sensationalist Reporting to Pseudoscience Communication

Alexandre Schiele
Hebrew University of Jerusalem, Canada

Did the media, in the short span of two years, successfully took on one of the most powerful organizations in the world, revealed one of the most damning conspiracies, shed light on the extent of the Deep State and finally pressed it into confessing its secrets? In 2017, former Blink-182 band member Tom Delonge created To the Star Academy (TTSA), a commercial corporation with the purported aim of furthering UFO disclosure through the medium of science fiction. On 16 December 2017, a New York Times article disclosed that the US Government secretly funded the Defense Department Advance Aerospace Threat Identification Program (AATIP), officially discontinued in 2011, which had come in possession not only of genuine UFO footage but also of suspected UFO material. On 3 August 2018, a subsequent New York Times article disclosed that the US military's official dismissal of UFOs was a deliberate cover-up, and that it continued to secretly track and monitor the phenomena. Their one and only source: Luis Elizondo, former AATIP director and now TTSA spokesperson. In April 2019, Politico, among others, revealed that the US Navy was drafting new UFO reporting guidelines. From 31 May to 5 July, History Channel broadcast a TTSA coproduced documentary miniseries: Unidentified: Inside America's UFO Investigation. On 17 September 2019, the US military confirmed that it was not only in possession of UFO footage, but that it actively monitored and tracked UFOs. CNN, among others, jumped to the conclusion that UFOs were both real and a potential threat to national security. Yet, the military only confirmed its tracking and monitoring of "unidentified aerial phenomena" in restricted airspace. This talk aims to raise a crucial issue: by willfully ignoring the uses and abuses of science in the wider mass media system, science communication practitioners have already undermined their very purpose.

650 Visual presentation

New approaches and formats for environmental reporting by a federal agency

Alexandra Schulz
German Environment Agency , Germany

Successful environmental policy requires reliable information on status and development of the environment. The German Environment Agency (UBA) therefore makes every effort to provide this information. Our work centers around gathering data concerning the state of the environment, investigating the relevant interrelationships and making projections – and then, based on these findings, providing information to federal bodies, stakeholders, scientists and the public.

The urgency to answer environmental questions has increased rapidly. At the same time, the complexity and the amount of environmental data has strongly increased, currentness and accessibility become more important, expectations of different target groups vary widely – how should we address all these challenges as a federal agency? Additionally, the communication of environmental policy issues has its own unique challenges, such as the time gap between environmental pollution and the noticeable consequences for society.

The UBA website contains more than 1,300 items of data in the form of tables, diagrams, infographics, indicators and maps. How can we provide all this information in a useful way? How can we address different needs of users? How can we approach environmental topics in a systematic way to show all the relevant interrelations? How can we use cognitive psychology to present our information in a suitable way?

In recent years we have developed various products to increase the usability as well as the accessibility of our data, including a data search, interactive maps, storytelling, infographics and a prospective new format to present cross-sectional topics called “environmental atlas”.

We want to expand our role as an evidence-based source of information for policy makers and as an independent actor in the evaluation of environmental data. We can only succeed in this if we improve access to the data and are able to present complex topics in a comprehensible way.

940 Insight talk

Selfobservation and -reflection in Science Communication

Simone Schumann
Open Science - Life Sciences in Dialogue, Austria

This talk discusses the qualitative research method of autoethnography as a valuable tool for science communication (research). Autoethnographies “are highly personalized accounts that draw upon the experience of the author/researcher for the purposes of extending sociological understanding” (Sparkes, 2000, p.21). They include selfobservation and –reflection and offer a way of giving voice to personal experiences in the research process. The author functions as research object often offering private and emotional details (see Ellis, 2004). Autoethnography challenges positivist thinking in scientific inquiries und thus also the role of the researcher as supplier of objective data through a strict separation of researcher and research object.

In science communication on the one hand a withdrawal of the communicator’s personal opinions, emotions, or experiences can be observed. On the other hand personal aspects seem to be communicated in a less reflected way. An autoethnographic mindset or procedure plays only a minor role in this field.

Based on these thoughts, we raise the following questions: How do our own values, opinions, and experiences influence our science communication activities? How to actively integrate the “communicator self” to design better science communication activities?

In this talk we strive to identify a conceptual link between autoethnography and science communication studies. We present examples from our work of how autoethnographic thinking and writing might be applied in different areas of science communication practice. This includes reflecting the pitfalls and challenges such an approach entails, such as the issue of exposing oneself or conflicts of interest with diverging opinions.

Brigitte Gschmeidler
Open Science - Life Sciences in Dialogue , Austria

882 Insight talk

Becoming artists to meet science

Francesca Scianitti
INFN Italian Institute for Nuclear Physics, Italy

Creativity and vision capability are common to many disciplines and are involved in artistic and scientific thinking and activities. Scientists and artists are often asked to see and think beyond the perceivable reality, to imagine aspects of things and events, which can be better seen from an unusual perspective. "Art&Science across Italy" is a European science communication project lead by the Italian National Institute for Nuclear Physics (INFN) in collaboration with CERN. The project is aimed at engaging high school students with science through the use of artistic languages, regardless of students' specific skills or level of knowledge. The first edition of the project (2016/18) involved 3000 students; the second one (2018/20) involved more than 4000 students from 11 Italian towns. The third edition (2020/22) started in December 2020 involving 4500 students from 15 Italian towns, plus Athens, in Greece. The first phase of the "Art&Science across Italy" project is aimed at training students on science and art; the second phase is aimed at designing and implementing an artwork inspired by one of the scientific topics treated during the first phase. The artistic tools used to represent scientific ideas and research topics can be painting, sculpture, photography, filmmaking, storytelling, or others proposed time by time by the students. All artworks lead to a local exhibition, established in either a historical or cultural centre or a museum, in each of the participating cities. Selected by an international committee of experts (scientists, artists, science communicators), the winners of the national Art&Science competition are invited to attend a school on art and science at CERN, in Geneva. Specific surveys submitted to students and teachers allowed us to evaluate the first edition of the project with very encouraging results. Media involvement in every local phase also ensured good media coverage of the project.

Pierluigi Paolucci
INFN Italian National Institute for Nuclear Physics, Naples, Italy

Mariaelena Fedi
INFN Italian National Institute for Nuclear Physics, Florence, Italy

Michele Michelotto
INFN Italian National Institute for Nuclear Physics, Padua, Italy

Dario Menasce
INFN Italian National Institute for Nuclear Physics, Milan, Italy

Simone Paoletti
INFN Italian National Institute for Nuclear Physics, Florence, Italy

1066 Insight talk

Experiencing Physics Demonstrations

Sydney Seese
Michigan State University , United States

Science demonstrations have long been a part of both formal and informal science learning, for which they have received both praise and criticism. In particular, studies of physics demonstrations have indicated that they do not promote understanding and retention of scientific concepts, yet they are still a mainstay of informal science learning as well as formal science education. Drawing on Dewey's theory of aesthetics we demonstrate the value of an experience model in examining physics demonstrations, and more broadly, informal science learning. Using thick description of demonstrations and interviews with a group of undergraduate demonstrators, we unpack the experience model. Through the lens of Dewey's experience, we view demonstrations as acts of expression that produce expressive objects with which audiences may have aesthetic experiences. Further, as Dewey suggests, expression and experience cannot be separated into their constituent parts, such as or emotion or understanding. We then further extend the experience model to help articulate the interconnected nature of six strands of informal science learning, produced by the National Research Council in 2009. These strands, which include excitement, reflection, and the ability to see one's self as a scientist, did much to articulate the ways informal science learning has value beyond understanding and retention. The experience model continues this important thread of informal science research by showing not only the value of these other aspects of science learning, but also the ways that they are inseparable from one another and from understanding. We conclude these strands cannot be pulled apart individually to describe an experience. Instead, they work in concert to create a tapestry of experience for both viewer and demonstrator, linking them together. This fits the theme of the conference because we are transforming the relationship between research and practice, drawing on practice to inform a concept.

Megan Halpern
Michigan State University, United States

Kathleen Hinko
Michigan State University, United States

688 Individual paper

CRISPRcas9: Ontology of the Gene and the Politics of Science-Society Conversations

Esha Shah
Wageningen University, Netherlands

In this presentation, I will discuss the way in which scientists explain the gene modification technique CRISPR cas9 to the non-scientific (public) audiences by taking several examples, including the conversations between science and society on CRISPR organised at Wageningen in June 2019. CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats) is a family of DNA sequences that Cas9 (an enzyme) uses as a guide to recognize and break or severe specific strands of DNA. CRISPR is widely presented by scientists as a “gene-editing” tool with revolutionary potential for genetic modification. I will explain how using this linguistic metaphor, the geneticists not only describe the gene as akin to “text” – in which a series of nucleotides become words – but the complicated process of gene modification is “reported” as “easy”, “simple” and “precise” as editing text at an exact location. I will then discuss the complex ontology of the gene as it is currently understood in two landmark projects – the sequencing of the human genome and Encyclopaedia of DNA Elements – in relation to the simplistic terms in which the gene is presented by the scientists in the CRISPR conversations. I will show how the scientists’ rhetorical construction of the gene object in linguistic terms although serves performative function that makes the object of the gene visible and accessible to both scientific and non-scientific audiences, it at the same time hides, conceals and detracts the complexities of locating life in a molecule. I will end my presentation by discussing the way in which the incorporation of the philosophy of front-end science on the complex ontology of the gene could possibly alter the back-end politics of the CRISPR governance and regulation.

Esha Shah
Assistant Professor, Department of Environmental Sciences, Wageningen University, Netherlands

Philip Macganghten
Professor, Knowledge Technology Innovation Group, Wageningen University, Netherlands

David Ludwig
Assistant professor, Knowledge Technology Innovation Group, Wageningen University , Netherlands

775 Individual paper

Our Extended Universe: Network Analysis and Topic Modelling of Science Communication Research over Time

Yuanyuan Shang
Australian National University, Australia

There has been longstanding interest in mapping the field of science communication and describing common topics using bibliometrics. Previous studies, as discussed in 2018 in Dunedin, have started from broad keyword searches, or specific journals. While providing a strong base for analysis, these can miss disciplinary-specific studies, either because they do not use generic keywords, or are published in discipline-specific journals.

Expanding on these and drawing on recent research in scientometrics, we used a multi-step approach: collecting articles published in dedicated science communication journals, then adding all other publications authored by those in the first collection. This dataset covers 22 years, and over 4,000 articles from over 6,000 authors. With this, we sketch a science communication "extended universe", beyond core journals or specific keywords, describing where and what science communication researchers publish.

We present the results of network analysis and topic modelling on this dataset, with common topics and journals identified both within smaller citation communities, and over the whole corpus over time to show the evolution of the field.

We conducted this study not only to add to existing conceptual discussions, but with utility in mind: as students, particularly in a research field often found after primary training in a different discipline, it can be difficult to navigate the many different topics even within science communication itself let alone our many adjacent fields. We invite commentary on whether the communities and topics make intuitive sense to researchers at PCST themselves, and where this research could go in future. We hope such a network can assist researchers in seeing their own work in place, and call to action future connections.

Samantha Vilkins
Australian National University, Australia

774 Insight talk

How Negative Emissions is Framed on Twitter: A Novel Application of Structural Topic Modelling

Yuanyuan Shang
Australian National University, Australia

Negative Emissions (NE) refers to technologies that are capable of taking carbon-dioxide (CO2) out of the atmosphere in order to limit climate change. Due to NE being in its infancy, there have been calls in academia to understand the framing of this concept in order to avoid the same kind of polarisation that climate change has endured. Frames in news-media do not give us an indication of how publics are engaging with and talking about different issues, whereas Twitter presents a stage where individuals can share their own beliefs and attitudes towards new technologies such as NE.

We will present our analysis of these frames on Twitter to highlight how different publics are conceptualising NE. Through a survey, we obtained 10 different keywords which researchers use to communicate NE, and then collected tweets containing these keywords over a three-month period through Twitter API (Nusers = 6,182, Ntweets = 8,524, Period: 10th June – 10th September 2019). Analysis of the tweets will involve Structural Topic Modelling (STM), an automated method of text-analysis, which can not only identify key topics within documents, but also directly estimate the impacts of metadata (e.g. geographical location) on topic prevalence. Twitter users will be coded into discrete groups (e.g. scholars, policy-makers and journalists) to test whether they are framing NE in the same, or different ways.

NE presents a potential pathway to a low carbon future and applying an STM method could be a promising way to gauge public perceptions. Our novel application of STM on a big Twitter dataset will provide insight into whether NE is being talked about, by whom and the different frames characterising it. This presentation will highlight how NE technology development is perceived and discussed, the potential barriers for future development of NE technologies and the subsequent implications for NE stakeholders.

Yuanyuan Shang
Australian National University, Australia

Nicholas Badullovich
Australian National University, Australia

570 Individual paper

Experts' bounded engagement with publics: An Interview-Based Study of Online Nutrition and Vaccination Outreach

Aviv Sharon
Technion - Israel Institute of Technology, Israel

Social media allow experts to form communities and engage in direct dialogue with publics, which can promote mutual understanding between sciences and publics. Moreover, it has been argued that the number and strength of the connections between experts and other stakeholders within a community can shape the community's engagement with science. However, little is known about experts' participation in online communities, or effective ways to prepare them for public engagement in communities. Here, we explored these issues with experts who voluntarily engage with publics on social media, to understand their public engagement practices. Stimulated recall interviews were conducted with 20 experts who participate in question-and-answer (Q&A) Facebook groups dedicated to vaccines and nutrition and analyzed using a naturalistic, qualitative approach. The findings suggest that experts employ diverse considerations in their outreach, partly to establish epistemic trustworthiness. These can be grouped into three goals and two constraints: countering misinformation, establishing competence and establishing benevolence while maintaining integrity and clarity. These goals and constraints are sometimes in conflict, and their relative importance may vary depending on the context: for example, on the vaccine group, experts tended to put forward features such as their competence and benevolence, whereas in less-controversial contexts, such as nutrition, this goal was less prominent. Empathic failure and burnout both emerged as factors that impair establishing benevolence. Thus, while the scholarly literature points to an untapped potential for scientists' outreach via social media, our findings underscore structural, affective and practical constraints on this outreach. After the term "bounded understanding of science" coined by Bromme & Goldman (2014) we propose the term "bounded engagement" with publics to describe the ways experts negotiate these conflicting goals and constraints in their public communication practices. Future work could incorporate these insights into the design of science communication training.

Ayelet Baram-Tsabari
Technion - Israel Institute of Technology , Israel

1144 Insight talk

Perception of youth towards COVID-19

Parul Sheth
National Centre for Science Communication, Mumbai, India

The COVID-19 pandemic is wreaking havoc on humanity. It has forced a tectonic shift in our way of living. The battle against the virus is on but the success of preventing its spread depends upon our perception and comprehension of the disease. In India, the management of the outbreak is promoted through public awareness and public understanding. Busting the age-old fallacies is imperative to bring on the transformation. On August 20, 2020, UNESCO celebrated the International Youth Day - “Youth engagement for global action”. Youth forms the major strata of our society. The power of youth engagement during the present crisis can be a major initiative towards creating scientific awareness and scientific temper in people. It is true that the student community has been the most sheltered one. Students are into online learning using e-based digital technologies for the past several months. An online survey was conducted amongst 90 girl students from science and arts streams studying at a Mumbai college in September and October 2020 when there was a 30 per cent decline in COVID-19 numbers in India. The objective of the survey was to assess the basic knowledge about COVID-19. A questionnaire was projected online and the students had to answer impromptu within a specific allotted time. Interestingly, the insightful knowledge about COVID-19 in young women from the science stream was praiseworthy. On the other hand, girls from non-science stream had little basic knowhow of the subject as compared to their counterparts. This study led us to believe that a lot remains to be done to educate our youth. More importantly, women empowerment remains at the forefront in adopting safe practices. A well-educated and cognizant youth can help communities to remain protected through stringent coping strategies.

Dr. Parul Sheth
Science Communicator, National Centre for Science Communicators (NCSC), Mumbai, India, India

Dr. Madhavi Kaji
Head, Department of Biochemistry, Sophia College, Mumbai, India,

1160 Individual paper

Shortcomings in public health authorities' videos on COVID-19: When lack of creativity kills the message

Marie Therese Shortt
University of Stavanger, Norway

Video communication has played a key role in relaying important and complex information on the COVID-19 pandemic to the general public. The aim of the study was to compare videos on COVID-19 published by Norwegian Health Authorities, WHO and on YouTube as a first step towards identifying whether videos by health authorities measure up to contemporary creative practices and video consumer behaviour on YouTube. Through structured search on YouTube, we found that Norwegian health authorities have published 26 (unique) videos to relay information on COVID-19, and the WHO, of which Norway is a member, a total of 29 videos. Press conferences, live videos and interviews by external media outlets were not included. A content analysis comparing these 55 videos to the 27 most viewed videos on COVID-19 on YouTube in video and channel data, video category, and creative presentation means, demonstrates a wide creative gap between videos created by the healthcare authorities and contemporary practices utilised in the creative media industry. Health authorities and WHO’s COVID-19 videos appear out of sync with popular online culture. A more reflective approach to creative communication can help increase the uptake, recall and reach of audio-visual communication on pandemics by public healthcare authorities. The study suggests future research areas to grow the evidence relating to creative choices and how they impact reach, viewers’ behaviour and trust.

Ionica Smeets
Leiden University, Netherlands

Siri Wiig
Centre for Resilience in Healthcare, Faculty of Health Sciences, University of Stavanger, Norway

Siv Hilde Berg
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Jo Rí¸islien
Centre for Resilience in Healthcare, Faculty of Health Sciences, University of Stavanger, Norway

1078 Individual paper

Kill, Contain or Support: Cognition and Controversy About Human Genome Editing in Twitter

Li Shuang
University of Science and Technology of China, China

In November 2018, Jiankui He, an associate professor in the department of biology at the Southern University of Science and Technology, announced the birth of twin babies in China, who were born immune to HIV because their c-c chemokine receptor type 5 (CCR5) had been modified through gene editing.This incident has attracted a lot of public attention and controversy in the range of the world, and has been seriously condemned by scientists and punished by the Chinese government.

Gene editing is a genetic engineering technique that allows humans to edit or modify specific target genes. Despite great prospects in genetic improvement or gene therapy, whether it is ethical and absolutely safe has been widely questioned.The doubts from the scientific community about the experiments of Jiankui He include the motivation and necessity of his experiments, the compliance of the experimental process, and the uncontrollability of his experimental influence.

Information technology has boosted the rapid development of the Internet, changed the channels of people's opinions and emotional expression, and further changed the way of emerging science and technology. Nowadays, more and more people are actively expressing their views and attitudes on NBIC technologies such as genetic engineering through social media and conducting communication or debate,which influences the development of relevant government-related decision-making and technology through the formation of public opinion.

The incident has also sparked a massive debate on social media about human genome editing. What perception, emotion or attitude does the public present when discussing this emerging technology? We captured the contents of human genome editing on twitter during this incident in this research,it is expected to grasp the emotion and attitude of netizens towards this technology through the computer-aided text analysis of these unstructured contents.

647 Insight talk

Is Science "Awesome"?: Reframing the Use of Awe in Science Communication

Daniel Silva Luna
University of Otago, New Zealand

Science communicators regularly highlight how science is wonder-filled and awe-inspiring. Implicit to this framing is that emotions such as ‘awe’ are evoked whenever the audience is confronted with an overwhelming scientific object or idea that challenges their previously held views. This ‘awe’ inducement then presumably motivates curiosity. Because many scientists are driven by curiosity, and their outputs challenge people’s understanding, some commentators have argued that ‘awe’ plays a special role in science and its effective communication.

Within the contemporary affective literature, however, the nature of emotions is the subject of intense debate, and these disagreements have both practical and theoretical implications for how the emotion category ‘awe’ is being utilized by science communicators. For example, although many affective researchers see ‘awe’ as an innate emotion that served adaptive functions in the evolutionary past (e.g., social submission), recent work in affective science calls this view into question. In particular, Barrett’s theory of constructed emotions contends that all emotions, including ‘awe’, are culturally-relative constructions learned through a lifetime of interaction with the respective emotion categories.

Following Barrett, I argue that people learn to a certain degree to experience ‘awe’ in their interaction with science communication. This means that science is not inherently awesome, but rather is made awesome as the result of being so frequently tethered to awe-related language and visual rhetoric. In other words, people’s experiences of ‘awe’ are held together by our communicative practices.

In support of this claim, I present the results of a word-association task that compared how awe is conceptually represented by those who regularly consume science communication to those who do not. In addition, I discuss out a new research program that can trace how emotions are being used to communicate science, with the goal of better understanding the public’s affective relationship to the subject.

Jesse Bering
University of Otago, New Zealand

1125 Visual presentation

Technology, lifestyle diseases and economic burden

Vinod Singh
Department of Zoology, University of Lucknow, India

The PCST2020 theme Time, Technology or Transformation is quite relevant in today's technology driven life.

The role of technology in improving our lifestyle and wellbeing is undeniable. It provides us socio-economic benefits, but can pose a serious challenge to our environment and health, thereby affect our financial future.

The technology has made our life comfortable but simultaneously given 'lifestyle diseases' such as diabetes, cancer, cardiovascular and respiratory diseases, along with depression, anxiety, and sleep and mood disorders. These disorders are chronic and progress slowly, and have a high cost of treatment e.g. in US, the yearly expenditures for diabetes and obesity cure are $237 and $147 billion respectively and cost of cancer care is expected to reach almost $174 billion by 2020. In Australia, the itemized expenses may be $330 million for heart disease, $92 million for strokes, $87 million for hypertension, almost $40 million for obesity, and $35 million for type 2 diabetes. India is also not far behind, as WHO report projects that lifestyle disorders will cost India $6 trillion by 2030, nearly nine times higher than the total health expenditure.

The economic burden of these diseases is seen at all levels; individual, family, society, community and the country. The key issue is to maximize the benefits of technology, and adopt a healthy lifestyle. Therefore we need to review the tradeoff between technology dependent health status and economic burden through well-developed links between research, policy, and practice and give a balanced opinion.

In the present poster, therefore, we intend to show the possible reason for rise in cases of lifestyle disorders, its impact on work performance and on economy of a country. This will open the avenues to search for the appropriate plans encompassing technology, health and economy.

Seema Singh
Department of Zoology, University of Lucknow, Lucknow 226007, India, India

Sanjeev Kumar
Department of Economics, University of Lucknow, India

Shalie Malik
Department of Zoology, University of Lucknow, India

1049 Individual paper

Choose Your Own Global Future: Using Interactive Digital Narrative for Science & Health Communication

Lyle Skains
Bangor University, United Kingdom

This presentation offers insights into the design process of two interactive digital narratives (IDNs) created to deliver science messages tailored to specific audiences. As such, it fits within the Technology theme of the conference: using an arts-based approach through interactive technology to communicate important science concepts. No World 4 Tomorrow is aimed at 13-16-year-olds, communicating themes on climate change and personal responsibility. Only Always Never is for adult audiences, specifically primary caregivers, designed to be experienced in GP surgeries' waiting rooms, communicating information about antimicrobial resistance.

Both of these ongoing projects seek to evaluate the efficacy of entertainment-based IDNs for communicating concepts related to increasingly urgent "global challenges". Games are the most dominant form of entertainment media currently in use, outperforming film, TV, and music. While a great deal of research has gone into the use of educational games, or "edutainment", far less has examined games designed foremost to entertain, and secondarily to communicate information. General audiences express resistance to media specifically created to educate, while pure entertainment can be shown to have significantly demonstrable effects on the public - such as the television show CSI's effect on jury behaviour, and celebrity endorsement of "anti-vax" stances leading to decreases in vaccination rates and increases in outbreaks of vaccine-preventable diseases. The intent with the IDNs presented was to purposefully communicate science matters of global importance without resorting to obviously "edutainment" games that audiences receive negatively.

This paper will discuss the design approach to the IDNs, methods for appealing to their target audiences, and initial audience responses from focus groups. It will include sample screenshots from the IDNs as well as focus group data, and will incorporate coverage of the software used to create the works, including rationale for its use.

959 Roundtable discussion

Journeys of Engagement: When do scientists take ownership of public engagement?

Kenneth Skeldon
Wellcome Genome Campus, United Kingdom

Over the years there have been multiple initiatives to encourage researchers from all disciplines to embed public engagement in their work. In the UK and Europe, research funders have been instrumental in this, through impact and engagement expectations on grants and how research outcomes are measured. However what is this actually meaning for the individual scientists and researchers at the 'coal face'? How do researchers currently feel about public engagement, while being expected to publish, attract funds and develop peer-respect in an ever more competitive research envrionment? The past decade has seen interventions aimed at aligning these factors, turning challenges into opportunities, but what realistically are the "journeys" needed for individual researchers and teams?

We have been exploring and comparing these issues within the considerable researcher communities of four major establishments - the European Molecular Biology Laboratory (based in Heidelberg, Germany with institutes across Europe), the Wellcome Genome Campus in Cambridgeshire, UK (home of the Wellcome Sanger Institute), the ADAPT Research Centre in Ireland (comprising Trinity College Dublin, Dublin City University, University College Dublin and Dublin Institute of Technology) and the University of Malta. We have surveyed the motivations and views of researcher communities around taking ownership of public engagement. In our chaired roundtable, we will first present comparative data from researcher communities to seed discussions of the success (or otherwise) of support interventions - including career incentives, training, impact and leverage of funding. We will explore what sort of institutional and external support measures enable successful journeys with public engagement, such that it can become 'normalised' as a beneficial and valued part of what researchers do.

Agnes Szmolenszky
European Molecular Biology Laboratory (EMBL), Germany

Emma Clarke
ADAPT Centre, Ireland

Edward Duca
University of Malta, Malta

1008 Visual presentation

Beyond Entertainment: Virtual Reality For Science

Annabel Slater
University of Glasgow, United Kingdom

Is virtual reality a suitable tool for engagement, or just a method of turning engagement into an entertainment game? Depending on what is permitted, we present either a video clip of a successful public engagement virtual reality application for researchers, or we present the virtual reality application itself which attendees may try for themselves. This application was created for our in-house public engagement service at the University of Glasgow, drawing on significant research into science communication and use of visualisation technologies, and working in collaboration with researchers. The application may be viewed either through inexpensive phone-based virtual reality sets (eg. Google Cardboard) or through a wired HMD headset with controllers. Through experiencing the application we demonstrate the strengths and weaknesses of virtual reality as a public engagement tool for researchers, and discuss how these aspects may be changed in the future as mixed reality – the combination of virtual and augmented reality - becomes widespread. We also present our research upon whether virtual reality applications move beyond providing entertainment, to creating lasting impact for researchers and enhanced public understanding of science.

Craig Daly
University of Glasgow, United Kingdom

1006 Demonstration

The Mixed Reality Microscope: Taking Public Engagement Into Virtual Reality

Annabel Slater
University of Glasgow, United Kingdom

Virtual reality and augmented reality are powerful disruptive technologies which are forecast to become leading elements of the fourth industrial revolution. They will eventually lead to mixed reality, the combination of the virtual and real world. These technologies are exciting and powerfully engaging. They are also powerful visualisation tools which can be applied to scientific data. These qualities present a novel opportunity for a new type of public engagement for science.

We present the ongoing development of our public engagement service, ‘Glasgow Life Sciences’, at the University of Glasgow. Our service takes microscope data into the digital world, bringing together mixed reality and microscopy. Our service empowers researchers to engage with the public in the online and virtual world, using data from their research. We demonstrate how virtual reality can not only provide a unique view of research imagery but create new ways to interact with it. We discuss our creation of one of the few existing open-access online repositories of microscopy data, and how we have moved microscopy data beyond the limitations of microscope-specific software in order to make it more accessible, and significantly usable for public engagement. We discuss how to bypass typical barriers in uptake of technology, regarding creating a virtual reality service. We also discuss how making research accessible for public engagement in the form of an online repository opens up new avenues for collaboration and teaching. Finally, we also discuss the feedback of researchers, educators and the general public in engaging with virtual reality for science, and the barriers that stand between researchers and the use of disruptive technologies for public engagement. We propose that public engagement must rapidly evolve to make use of disruptive technologies of the digital age.

Craig Daly
University of Glasgow, United Kingdom

972 Linked papers

Overcoming misinformation about science in the media

Ionica Smeets
Leiden University, Netherlands

Misinformation about scientific results is omnipresent in the media with claims such as ‘Treating with statins a waste of time' or ‘Hot tea causes cancer’. In this session we discuss ways to overcome this type of misinformation, from both a theoretical and practical standpoint. We present a series of papers that look at the interaction between scientists, press officers, journalists and readers in transforming health news.

Are academic press releases that are carefully aligned with the evidence less newsworthy? How do researchers work with press information officers? Does communicating caveats disengage readers? Can expert quotes help readers in making sense of science news? And is myth busting an effective method for overcoming misinformation?

Our speakers are academics and science communication practitioners from the United Kingdom and the Netherlands with backgrounds ranging from psychology to communication science. We will limit the presentation of each of the papers to at most ten mintues and aim for a lively discussion with the participants of this session about how to overcome misinformation about science in the media.

The order of our papers will be:

1. Petroc Sumner - Claims of causality in health news: A randomised trial

2. Roy Meijer - How do (should?) researchers work with their public information officers?

3. Ionica Smeets - Independent expert quotes as an indicator for better science news

4. Aimée Challenger - Is myth busting an effective method for overcoming misinformation?

Claims of causality in health news: A randomised trial

Petroc Sumner
Cardiff University, United Kingdom

Misleading news claims can be detrimental to public health. We aimed to improve the alignment between causal claims and evidence, without losing news interest. We tested two interventions in press releases, which are the main sources for science and health news: (a) aligning the headlines and main causal claims with the underlying evidence (strong for experimental, cautious for correlational) and (b) inserting explicit statements/caveats about inferring causality. The trial included press releases related to human health (N = 312; control = 89, claim alignment = 64, causality statement = 79, both = 80) from nine UK press offices (journals, universities, funders). Outcomes were news content (headlines, causal claims, caveats) in English-language international and national media (newspapers, websites, broadcast; N = 2257), news uptake (% press releases gaining news coverage) and feasibility (% press releases implementing cautious statements). Our results showed that news headlines and claims were better aligned to the evidence when the press releases were also aligned. This was also true for causality statements/caveats. There was no evidence of lost news uptake for press releases with aligned headlines and claims or causality statements/caveats. Feasibility was demonstrated by a spontaneous increase in cautious headlines, claims and caveats in press releases compared to the pre-trial period. Psychologist Rachel Adams will show how this trial demonstrates that news claims —even headlines— can become better aligned with evidence without harming news interest. Findings from our as-treated analysis are correlational and may not imply cause, although here the linking mechanism between press releases and news is known. Our intention-to-treat analysis was insensitive due to spontaneous adoption of interventions across conditions.

How do (should) researchers work with their public information officers?

Roy Meijer
Delft University of Technology, Netherlands

Scientists in general are not very happy when their research gets misrepresented - for whatever reason - in the media.

In the long run, it’s not helpful for the reputation of their institute either, which is of course what concerns press officers, or at least, that is the common assumption. Key to making sure things go right when scientists interact with the media lies mainly in the preparation of an interview and in managing expectations, in this case mainly the expectations of the scientist (although journalist’s expectations could sometimes also do with some management). What is realistic to expect when you are being interviewed, and how much control do you have as the interviewee over that situation? Expectation wise: how much actual ‘air time’ or coverage can you expect to see back from that hour long interview? (Spoiler: maybe as much as 20 seconds in the TV item or one small quote in the whole article.) And where does that misleading headline come from? Press officers (or PIO’s - public information officers) should play a key role here, being the intermediary between the fast and furious world of journalism and the slow and nuanced world of science. As PIO of Delft University of Technology (The Netherlands) Roy Meijer will talk about what their communication department actually offers scientists in the way of practical (media) advice, services and damage control and what in their experience and view counts as impact in the real world. He will moreover answer the question how it is possible that a press release and the related newspaper article can sometimes be published at the exact same moment.

Is myth busting an effective method for overcoming misinformation?

Aimee Challenger
Cardiff University, United Kingdom

Beliefs based upon misinformation can be problematic as they are typically stronger and more resilient to correction than those based upon ignorance. For example, the fallout from the erroneous link between the Measles, Mumps and Rubella (MMR) vaccination and autism is still being felt today. The World Health Organisation recently announced that the UK have lost their measles free status. Myth busting, whereby misinformation is presented alongside a corrective fact, is often employed by public health campaigns. Counterintuitively, some research has reported that myth busting can backfire. Backfire effects occur when repetition of the myth reinforces the misinformation and subsequently the fact is forgotten. Aimée Challenger will talk about whether myth busting can successfully debunk misinformation about influenza vaccinations, or whether this common strategy backfires. Influenza vaccinations are recommended for healthcare workers annually but historically uptake has been low. The first phase of the study did not find a backfire effect for either flu or diet-related myth busting in members of the general population. The second phase of the study examined posters with or without myth busting on vaccination intentions and attitudes in members of the general population. The third phase of the study tested myth busting posters in healthcare workers.

842 Insight talk

Video-News and climate change communication: new formats, frames and images in a changing social media platform landscape

Leonor Solis

Ecosystems and Sustainability Research Institute, UNAM, Mexico and Universidad de Navarra, Spain, Mexico

Understand how social media platforms are transforming science-society relations, and how they interact with news media and audiences to communicate relevant scientific issues such as Climate Change (CC), represents one of the main challenges of Science Communication research nowadays. Social Media research on CC has focused mainly on text analysis within the Twitter platform, and CC visual communication studies have mostly analyzed still images from news media. However, there are still gaps in the existing literature about the role played by audiovisual materials such as native videos on Facebook , the platforms with the largest audiences or growth worldwide. The aim of this study is to: (1) analyze how climate change is represented by Facebook native news-videos (2) compare the visual representations with those previously studied in print and television. Through a quantitative content analysis of a sample of legacy and new media facebook native videos. Results show that social video news, present innovative themes, frames and visual formats to communicate climate change, to reach audiences. Social-news-videos present new visual proposals and a more correlate discourse and image than the ones used by TV and press media. But still they maintain a catastrophic discourse, consecuences and activist frames and visuals, that correlates with the shareability of the content from a clickbait perspective, they are effective to hook new audiences. Findings are expected to contribute further theoretical and methodological approaches for future research of social media by integrating analysis of discourse and visual content on relevant issues concerning science communication.

834 Insight talk

Engagement interdisciplinary approaches in STEAM : Learning Science Through Theater

Menelaos Sotiriou
Science View, Greece

How can we leverage students understanding on STEM concepts and at the same time guarantee their cheerful engagement so to communicate scientific notions to the public? How can we transform school to a science communication hub that connects the scientific world and the local community? Learning Science Through Theater (LSTT) initiative strongly promotes the above principles by creatively merging STEM with Art in a dialogic/inquiry process. Theater is used as a means of deliberation, a vehicle around which the whole team of stakeholders builds relationships that favor the communication and transfer of scientific knowledge.

Students build their understanding on scientific concepts applying and developing knowledge from their curriculum and become acquainted with the concept of communicating science creatively. Develop skills in communicating science to audiences in their local communities. They manage to develop creative skills in a spirit of cooperation and teamwork (create a ‘cognitive object’ such as script, scenography, costumes, music or even a video composition). This process, engages students in a highly motivating environment where they learn to recognize, analyze and imagine alternative explanations and models and communicate a scientific argument or issue in a creative and alternative way.

Public Engagement with Science as well as Science Communication in terms of informal science education refers to activities, events, or interactions characterized by mutual learning - not one-way transmission from “experts” to publics - among people of varied backgrounds, scientific expertise, and life experiences who articulate and discuss their perspectives, ideas, knowledge, and values.

With 5 years of implementation background and a framework strongly aligned to the most recent EU demands for shaping the scientific literate citizens of the future, LSTT achieved a remarkable engagement of the target groups set and important results in the field of Science Communication by involving 3000 students, 250 teachers, 6000 parents and 1000 stakeholders.

690 Individual paper

Who are "we"? Negotiating public health authority and citizen responsibility in British Columbia's COVID-19 communication

Philippa Spoel
Laurentian University, Canada

In British Columbia, Canada, public health officer Dr. Bonnie Henry’s pandemic communication has been widely commended as key to that province’s relatively successful efforts to curb the spread of COVID-19. Tworek et al. (2020) praise Henry’s “pro-social” discourse for promoting individual citizen autonomy in making responsible decisions to support both personal and collective health. From our perspective, Henry’s numerous public briefings present a valuable site for investigating how COVID-19 communication is enacting news forms of behavioural health promotion and citizen responsibility for health. Through a rhetorical analysis, our presentation investigates how this communication negotiates the boundaries between public health authority-expertise and citizen engagement in making informed decisions and taking effective actions. We focus on the prominent, but complex and ambiguous, use of first-person plural pronouns (we, us, our) to construct a rhetoric of identification (Burke 1969) between health experts and citizens. We trace the polysemous, shifting meanings of these pronouns by examining the kinds of people, knowledge, and actions with which they are associated. Our analysis shows how “we” primarily appears to refer to an inclusive sense of community in which both expert and non-expert citizens act together to curb the virus’ spread. However, “we” also refers to public health authorities whose expertise directs the decisions and actions that ‘good covid citizens’ are expected to perform and, when the appeal to voluntary good behaviour is ineffective, are the ones who issue orders that require—not simply encourage—specific behaviours. While the slippages in Henry’s use of first-person plural pronouns may be strategically ambiguous, they raise questions about the nature of the relationship between public health experts and citizens as well as what kinds of citizens are not included in the “pro-social” rhetoric that these public briefings enact.

Naomi Lacelle
Laurentian University, Canada

Alexandra Millar
Laurentian University, Canada

572 Visual presentation

You Couldn't Make It Up: Sci-fi Vs Sci-fact

Jon Spooner
Arts Organisation, United Kingdom

Unlimited Theatre specialise in collaborating with scientists and telling stories inspired by leading edge developments by researchers at the forefront of their fields.

In recent years Unlimited's Artistic Director Jon Spooner has worked with leading researchers and instituions in human enhancement and biotechnologies, space exploration and quantum physics to create theatrical events and immersive experiences to bring their research to the public and create a deeper conversation about the potential applications of their work and the social, political, philosophical implications they might bring.

In 2019 Jon is a Visiting Scholar at Wolfson College, Oxford University where he is working with the Quantum Hub (led by Professor Vlatko Vedral) to help tell the story of their work in Information Theory. In another project he is collaborating with a wide range of partners including Dr Tim Constandinou (Director of the Centre for Bio-inspired Technology at Imperial College London), Professor Kostas Kostarelos (of the Nanomedicine Lab at University of Manchester) and Dr Kia Nazarpour (of the Intelligent Sensing Lab at University of Newcastle) to create a large scale "Expo" event showcasing and debating issues of advanced prosthetics, sub dermal and brain implants, 'cures' for aging and other leading edge, health related biotechnologies.

In this presentation, Jon outlines the benefits for scientists to work with artists and create fictional worlds for researchers and audiences to immerse themselves in, that significantly deepen public conversation on developments in contemporary science.

This presentation will be of use to anyone interested in the changing relationship between science and the arts and humanities (Time), innovative practice in communicating technology advances and their social implications (Technology) and how to shape transformations of science-society relations (Transformation).

unlimited.org.uk

556 Individual paper

Public Relations and Science Communication: A Case Study of Selected Health Research Institutions in Uganda.

Karl Raymond Ssentongo
Uganda National Council for Science and Technology, Uganda

Public Relations is a powerful tool used by many organisations and individuals to promote the organisational influence and understanding among the key stakeholders. Public relations practice usually takes four forms that include press agentry, public information, two-way symmetrical and two-way asymmetrical. Organisations choose what best suits their mission. The aim of this study was to analyse how research institutions in Uganda leverage on Public Relations to bring about a better understanding of science. Using a mixed-method approach, qualitative data were collected first through interview guides with a select group of researchers (scientists) and public relations practitioners at Makerere University School of Public Health, Natural Chemotherapeutics Research Institute and Uganda Virus Research Institute. A sample size of 400 respondents from the districts of Kampala and Wakiso was also obtained for the study for the quantitative part of the study. My findings indicated that Public Relations was not a grounded function at the selected institutions. However, there were intermittent efforts to carry out public engagements or sensitisation about ongoing or impending studies. Most respondents believed literature provided by the researcher is not easy to understand thus requiring the scientists to be there in person. It was concluded that the three research institutions hardly dialogue with their target audiences, thus hindering Public Relations for effective communication. I opined that research institutions could do better with the deployment of Public Relations experts to steer the stakeholder engagement portfolio, engender public trust in science and technology and subsequently ease comprehension of science and technology.

682 Individual paper

Gene drive technology in the UK, US and Australian press: Exploring tensions between responsible research and responsible science communication

Aleksandra Stelmach
University of Exeter, United Kingdom

This article explores tensions surrounding the communication of gene drive technology in comparative perspective. Gene drive is a controversial genetic engineering technique which makes it possible to modify the genetic make-up of organisms and to spread the new traits through the population. There are proposals to use gene drive technology in wild animals, e.g., to control invasive species, such as mice, or disease-carrying organisms, such as mosquitoes. Decisions involving the potential use and governance of gene drive will require an empowered and culturally relevant dialogue between stakeholders and communities, especially in the areas where gene-drive organisms could be released. To support and understand such dialogue it is necessary to gain insight into the context, including the media context, in which it takes place, as this can influence how gene drive is debated and, potentially, deployed. We focused on three countries where this technology is being developed and/or could be used: the UK, US and Australia. We used the media database Factiva to identify 159 articles on gene drive published in 2015-2019 by major media sources, including elite media. We analysed the sample focusing on metaphors and rhetorical devices. The analysis revealed significant tensions in reporting. On the one hand, scientists and the wider gene drive community promoted positive and novel discourses of biotechnology, foregrounding scientific responsibility and caution, and highlighting commitment to transparency and democratic dialogue. On the other hand, this foregrounding of scientific responsibility happened against the background of reports which represented gene drive as a high-risk technology. While the media in the UK, US and Australia differed in the ways they reported on gene drive, most news coverage fell back on sensationalist or catastrophic metaphors to convey hopes and fears related to this technology. We discuss the implications of these findings for responsible science communication.

Brigitte Nerlich
University of Nottingham, United Kingdom

Sarah Hartley
University of Exeter, United Kingdom

856 Individual paper

Moving through time

Jörgen Stenlund
Örebro University, Sweden

Communicating evolutionary theory continues to demonstrate significant challenges. One particularly demanding area is comprehending evolutionary time scales. Furthermore, visual representations such as the Tree of Life usually incorporate temporal aspects but require interpreting the underlying biological concepts as well as the representational features used to convey evolutionary meaning.

In this paper, we investigate how users engage with the DeepTree exhibit, an interactive touch table visualization of a dynamic Tree of Life (Block et al., 2012). The main purpose of DeepTree is to visualize the relationship of all life on earth. Specific focus of this paper is to explore how a zooming interactive feature which enables users to move virtually from the origin of life to present day species, influences perception and understanding of evolutionary time associated with the tree metaphor. The aim of the study is to explore how the zooming feature affords new ways of understanding the information which the dynamic tree metaphor conveys, what properties of zooming interactions are associated with various temporal aspects and how moving in time is perceived.

A video recorded clinical, semi-structured interview was conducted with each participant while s/he interacted with the DeepTree application. The analytical method used to treat the generated data was a combination of deductive and inductive coding of the transcripts and accompanying visual recordings.

The findings suggest that DeepTree is a natural and intuitive touch-based interface for navigating the metaphor of biological relationships. Interacting with the visualization induced various positive affective reactions. However, in its present design, DeepTree may not completely support users' understanding of evolutionary time. The results indicate that zooming can be interpreted in different ways. This suggests that the embodied and immersive experience offered by such interactive tree applications might strongly influence users' temporal interpretations associated with evolution concepts if they are designed appropriately.

Lena Tibell
Linköping University, Sweden

Konrad Schönborn
Linköping University, Sweden

793 Visual presentation

Saving the world, one scicomm text at a time: liberal education and the art of science communication

Florentine Sterk
Utrecht University , Netherlands

My poster presentation will provide visual insights into science popularization skills that liberal education students at Liberal Arts and Sciences (Utrecht University) already possess at the start of their studies. Students wrote a short newspaper article suitable for a broad audience based on an academic paper and filled in a questionnaire about self-perception of writing abilities. I discuss what happens when these students try to communicate outside of their academic circle by showing both the methodology used for text analysis and results from the study.

Liberal education students are unique: they have their own personalized training program, different disciplinary interests and become interdisciplinary researchers. For their future careers, impact on society is important: these programs attract students that set out to save the world.

Liberal Arts and Sciences at Utrecht University operationalizes interdisciplinary teaching and learning, combined with principles of liberal education. Liberal education lets students build a strong knowledge base through broad learning in all three main academic fields, whilst specializing in their preferred field. It is a writing-intensive program that teaches skills for writing essays, papers and interdisciplinary research reports by focussing on rigorous teacher feedback, peer feedback and evaluation through rubrics. Whilst liberal education trains a variety of academic skills, most undergraduate programs fail to deliver training in communicating outside of academy walls.

Science communication for interdisciplinary research settings and teaching science popularization for liberal education are both unexplored fields. Science popularization skills are important for these students, because liberal education studies current societal issues – topics that need communication for students' insights to make a real impact. Furthermore, collaboration in interdisciplinary research settings means communication needs to transcend disciplinary boundaries. This poses a challenge for teaching science communication, as does the heterogeneous mix of students from all disciplinary fields.

Merel van Goch
Utrecht University, Netherlands

Michael Burke
Utrecht University, Netherlands

Iris van der Tuin
Utrecht University, Netherlands

820 Demonstration

Cell Block Science

Mhairi Stewart
University of St Andrews, United Kingdom

Could you take science communication into your local prison? What opportunities could it open up, and for whom? What barriers would you face?

We demonstrate learning from Cell Block Science, bringing science communication activities into Scottish prisons. Blocks of eight sessions are delivered by researchers with help in development and delivery from a public engagement professional. The project not only reaches new audiences but also provides opportunities for researchers to improve science communication skills and develop activities that can be used in wider contexts.

In the past year, 106 researchers have delivered sessions to over 463 learners. Over a half of these learners were new visitors to the learning centres, and 95% stated they would continue visiting in order to take part in the project. We also engaged with 170 learners' family members, delivering at family learning programmes or at visits, resulting in some of these individuals being motivated to attend science festival events. While there are no formal learning outputs to the sessions, several artistic, creative and written outputs have been recognised by external organisations and we are planning to trial linking delivery to an 'Inquiry Unit' from the Scottish Qualification Authority, leading to accreditation for participation in Cell Block Science for learners and providing evidence supporting the wider inclusion of science in the curriculum.

Through opportunity and partnership, our project has grown in three years from a small pilot to a nationwide activity involving half of all Scottish prisons, four Universities, professional science communicators, and partner organisations such as museums and zoos. We also have two projects in English prisons taking our format and adapting it to their own local contexts. We invite delegates to hear about our experiences from academic and prison partners, and reflect on how they might transform our experience and learning to their nation and local contexts.

Francesca Fotheringham
University of St Andrews, United Kingdom

Barbara Gorgoni
University of Aberdeen, United Kingdom

734 Individual paper

Trust in science around the world: results from the first Wellcome Global Monitor survey

Patrick Sturgis
Professor , United Kingdom

The Wellcome Global Monitor (WGM) is the world’s largest study into how people around the world think and feel about science and major health challenges. It surveys over 140,000 people in more than 140 countries, covering over 90% of the global population. For many of the countries included in the WGM this is the first time attitudes to science have been surveyed, making it an incredibly rich resource for understanding diverse public responses to science and technology. The first wave of the Global Monitor was carried out in 2018 and addressed topics including beliefs about the efficacy of vaccination, the equitable distribution of socio-economic returns to science and technology, and trust in scientists and scientific instituions. In this presentation, I will provide an overview of the design of the study and present findings on a key focus of the first wave: the level and distribution of trust in science across the globe. In addition to presenting data on average levels of trust across countries, the presentation will also assess to what extent predictors of trust in science based on surveys conducted in developed countries generalise to other, less frequently surveyed, parts of the world. In particular, the analysis will consider the robustness of religiosity and scientific knowledge as predictors of trust in science when considered in a global context.

Ethan Greenwood
The Wellcome Trust, United Kingdom

941 Individual paper

Electric dreams: putting past science communication approaches to work in the present

James Sumner
University of Manchester, United Kingdom

Science communication policy innovations often define themselves in opposition to discredited past approaches, a classic example being the deficit-to-dialogue shift. Nonetheless, it’s sometimes worth exploring whether today’s practitioners can usefully learn anything from the educators and popularisers of past generations. I address the possibilities through a case study of my experience developing Electric Dreams, a public engagement project which grew out of collaborations between the University of Manchester’s taught graduate programmes in science communication and the contemporary history of science and technology. Chiefly addressing family audiences at public events, we evoke the public science and technology of the 1980s through interaction with original computer hardware, electronic toys, TV and radio equipment, posters and books.

Creating and refining Electric Dreams revealed limitations, but also opportunities in the approach. The hardware itself, for instance, is often inconvenient to transport and maintain, yet it also has features – large size, low speed, limited features – which can be advantageous when the aim is to communicate underlying principles. Similarly, while some of the cultural baggage of 1980s popular science proved inappropriate or unengaging, we had some success in reviving demonstrations from the BBC TV series Take Nobody’s Word For It (1987-1990), whose kitchen-science approach turned out to provide an engaging blend of the easily assimilated and the unexpected. We also sourced and presented items that usefully demonstrated the long-term development of current advocacy priorities such as women-in-STEM and environmental sustainability. My presentation analyses the techniques used, their successes and the difficulties encountered, to suggest how they might be transferred to other historically informed public engagement projects.

1110 Visual presentation

Stellar Entangelment - VR Video

Jan Swierkowski
Universidade Católica Portuguesa, Portugal, Portugal

The connections between particles in the Universe do not differ from the connections between us. Is it possible, however, that some of us are contaminated with the same elements that constituted past civilizations? In the end, as astronomers say, each of us carries a souvenir of cosmic catastrophes - supernova explosions. If so, is the fact that we are built of the same matter as the fiery nuclei of stars allows us to be called “children of stars” or is there something more needed? "Stellar Entanglement" (2019) is a VR project resulting from the merger of two galaxies - the art and science group Instytut B61 and the directing duo The Kissinger Twins.

The effect of the symbiotic cooperation of artists is a lot more than just a VR experience dealing with the issue of cosmic quantum entanglement. The project, based on the motifs of the immersive spectacle directed by Jan Swierkowski, tells the story of a mysterious scientific institute trying to secure the immortality of a civilization imprisoned on a doomed planet in a remote region of our Galaxy. However, its main focus is the search of the place of the Universe inside the Humans.

The VR film can be presented along with one of the figurative installations presented in the immersive performance depicting the magnitude and infinity of the Universe. The giant "Sand Machine" by sculptor Dominik Smuzny is used by the Institute B61 in order to calculate the IT (Infinite Things). Each of the more than one billion grains of sand constituting its base represents one of the Stars of the Milky Way. The machine itself contains still at most one-hundredth of all stars in our Galaxy. However, there are over two billion galaxies in the Universe. Is it possible that we are alone?

1107 Visual presentation

Art & Science of the Invisible: Translating through metaphors

Jan Swierkowski
Universidade Católica Portuguesa, Portugal, Portugal

The author has observed that many artists that work at the intersection of art and contemporary physics experience problems to introduce in their creations the radically new knowledge (Petrie, Oshlag, 1993) of quantum theory or theory of relativity, mainly due to the uncanny nature of “the invisible”. The basic view that the author shares is that interactive metaphors (Black, 1962) allow for instant understanding of the unknown in various symbolic systems at the same time, such as among others words, music, painting, photography, sculpture, architecture, and dance (Limont, 2004). Therefore the goal of this presentation is to propose how practitioners in the field of art and science can systematically conceptualize and create representations of contemporary scientific phenomena that can’t be explored through direct experience using different theories of metaphor (Black, 1962), (Lakoff, Johnson 1980), (Fauconnier, Turner 2002), (Brandt, Brandt 2005), (Forceville, Urios-Aparisi, 2009) and intersemiotic translation (Jakobson, 1959), (Eco 2001). The author created an experimental methodology of creation of novel multimodal metaphors in a controlled process of collaboration between artists and scientists. The resulting artworks are large scale immersive performances, video art and interactive digital stories of an art and science group Instytut B61 (http://bit.ly/Instytutb61). Among many presentations the group has created a mobile exhibition about Special Theory of Relativity in a cargo train from Tallinn to Lisbon (http://bit.ly/cosmicunderground), an immersive performance in a postcolonial hospital in Panjim, Goa (http://bit.ly/panjimb61 p74-93) and participated in the celebrations of the European Capital of Culture in WrocÅ‚aw, Poland (http://bit.ly/wroclawb61). The most recent work includes a cinematic VR experience “Stellar entanglement” (2019) (http://bit.ly/stellardemo) and a pop-up science centre “Interstellar Sugar Center” in an antique sugar factory in Ponta Delgada, Portugal described by the Forbes as “euphoric and mind-bending, with a touch of Clockwork Orange.”(http://bit.ly/forbesreview). The author will discuss the methodology and practical examples.

1074 Visual presentation

Science podcasts: a new territory for Brazilian indigenous people

Roberto Takata
DDC-UFMG/Labjor-Unicamp, Brazil

This project aims at empowering indigenous students of the State University of Campinas (UNICAMP), a Brazilian public university, through podcast. Students are receiving training in science communication to engage as mediators of university and society. Students are mainly from São Gabriel da Cachoeira (AM) - the largest indigenous population city in Brazil - and have enrolled at University in 2019, as the first group of indigenous students at one of the most scientifically prolific universities in Latin America. The podcast will promote dialogue to contribute to change perceptions and bias about scholarly and indigenous communities and strengthen diversity for sustainable development and a improve science-society interaction.

Ecoa Maloca podcast debates challenges, social practice, research, scientific and indigenous cultures, diversity and different views about sustainable development and gives voice to students as a way to empower them and make them feel part of the university. Five podcasts were produced on the topic “Bioeconomics: Diversity and Wealth for Sustainable Development”. Each episode addresses aspects that bring to debate the challenges, social and research practices, indigenous and scientific culture, the diversity of cultures, and visions necessary for sustainable development focusing on the Amazon background.

By bringing indigenous students at university, Unicamp has the opportunity to exchange scientific knowledge, destroy bias, and strengthen its investigations and relationship with indigenous communities and population in general through indigenous students as moderators. The podcast will be streamed on podcasts platforms and through radio channels as a way to guarantee that it reaches indigenous populations in Amazonas State.

Germana Barata
Labjor-Unicamp, Brazil

Sangion Juliana
Labjor-Unicamp, Brazil

Daniela Barbosa
Unicamp, Brazil

Edinho Rodrigues
Unicamp, Brazil

1076 Visual presentation

Silence in the studio: profile of Brazilian science podcasts

Roberto Takata
DDC-UFMG/Labjor-Unicamp, Brazil

The media landscape in the Brazilian public science communication scene is facing a rapid change in the digital era. The once prominent science blogosphere seems to be in crisis and had stagnated or maybe is even shrinking in size. New media are striving instead. Among them are certainly science podcasts. The podcast is an audio format that can be distributed through the internet as a radio program on demand. It is a growing fast media with several genres and topics. However, there is not many quantitative analysis for Brazilian science podcasts: How many are there? Are they really growing in number? What are the episode lengths? What is the demography of the hosts and producers? Aiming to answer those and other questions, we search on social media like Twitter and Facebook, and Google search engine for science-based podcasts and we access the information available on their websites to create a database with basic information about the Brazilian podcasts. We have found about 70 podcasts in that criteria, being the first one still in activity starting in 2008 and the last one in 2019. We detected an exponential growth (average annual growth rate of 29,7%) in the number of active podcasts over the last 5 years, and predominance of episode durations of 15 to 30 min and about 60 min. The great majority of hosts are from Southeastern Brazil. With a good diagnosis about science podcasts landscape in Brazil, hopefully, it could help to identify factors such as themes and formats that are underexplored.

Rubens Pasa
UFV-Rio Paranaàba, Brazil

Karine Kavalco
UFV-Rio Paranaàba, Brazil

1140 Individual paper

Public engagement with Science among Religious Minorities: Lessons from COVID-19

Lea Taragin-Zeller
Technion and Cambridge, Israel

Drawing on the disproportionate magnitude of COVID-19-related morbidity on Israel's Ultra-Orthodox Jews, in this paper we examine their processes of COVID-19 health decision-making. While scholars have highlighted how science communication reifies forms of structural inequality, especially race and gender, we examine the challenges science communication pose for religious minorities. We ask: How do religious minorities engage with/and learn about science in their everyday lives? Is conventional public health messaging effective when dealing with a minority population with specific cultural practices and religious beliefs? And, what are the limits of receptivity of science and health advise among specific minority groups?

In Israel, at the height of the pandemic in March-June 2020, Ultra-Orthodox (Haredi) Jews accounted for 40-60% of all coronavirus patients at four major hospitals, even though they make up only 12% of Israel's population (Waitzberg et al, 2020). In our study, we draw on studies in science communication to explore the ways Ultra-Orthodox Jews in Israel learned about the pandemic and examined their COVID-19-related decision-making.While scholars have argued that individuals operate either religious or scientific epistemologies (O'Brien and Noy 2015), our survey results show that both religious and health-related justifications were common for personal decisions. Yet, a disparity was found between the ways social distancing guidelines were perceived in the general education context compared to the religious context. Based on these findings, we argue that science-related communication and decision making is negotiated within and through many actors and systems of 'local' knowledge, since both scientific knowledge and socio-religious frameworks serve as "cultural and epistemological tunnels" of COVID-19 interpretations, attitudes and behavior (Canfield et al, 2020). The findings make a strong case for the importance of inclusive models of science communication that account for religious sensibilities and state-minority relations.

Yael Rozenblum
Technion, Israel

Ayelet Baram-Tsabari
Technion, Israel

973 Individual paper

Opening the black box: deconstructing AI with young people to foster critical discussions of technology

Georgie Tarling
University of Exeter, United Kingdom

Are young people concerned that machines and computers will dominate society and take over most existing jobs? Do they believe that AI will lead to great developments in diagnosing most diseases? What are young people's major concerns about AI and big data? And what do they think they need to learn in order to be able to communicate and have agency in rapidly evolving socio-technical contexts?

This presentation explores how a holistic understanding of programming and its ethical implications in society can serve to foster critical conversations around AI and data science amongst young people. Our research is based on a case study of the 2018 and 2019 Institute of Coding Summer Schools, at the University of Exeter, in coding, data analytics and AI for non-STEM students. Drawing on data collected through questionnaires, focus groups and interviews, we identify young people's perceptions of AI, analysing how these changed and contributed to their confidence to participate in debates around uses of technology, after deconstructing the processes of AI through programming and machine learning. Within three weeks, students were building basic facial recognition software, creating apps and web-scraping tools and producing data journalism. The findings show that through these processes they were able to gain more informed understandings of the affordances and limitations of machine learning and data science and to talk about some of the ways in which bias, stereotyping and flawed or constrained decision-making might be built in to technology.

By illustrating this interdisciplinary approach around AI, our study makes an original contribution that addresses a gap in the research in this matter (Whittaker et al; Adams & Burall), bridging the gap regarding the levels of explanation of algorithmic processes that people find helpful in making decisions or engaging critically in discussions about technology (Whittlestone et al.).

Ana Melro
University of Exeter, United Kingdom

Georgie Tarling
University of Exeter, United Kingdom

Judith Kleine-Staarman
University of Exeter, United Kingdom

Taro Fujita
University of Exeter, United Kingdom

717 Insight talk

Science Communication in The Age of Internet Trolls and Political Polarisation

Padma Tata
, India

Beginning in the 1990s the internet became a major purveyor of news and information, and its influence multiplied with the rise of social media. Internet trolls and bots spread false and misleading stories rapidly through online social networks and Internet trolling offers a new avenue of attack. In the current political and media environment, faulty communication is no longer the core of the problem of scientific communication; the widespread dissemination of misleading and biased information is emerging a bigger problem. The current political polarisation in many countries is also impacting science communication. Whenever scientific findings clash with a person or group’s political agenda, scientists can expect to encounter a targeted campaign of fake news, misinformation, and disinformation in response, no matter how clearly the information is presented or how carefully and convincingly it is framed, as is witnessed with climate science, genetically modified food or vaccination. Analysis of science policy is attacked as politically motivated.

The presentation will discuss some recent cases as representative of the global nature of the problem and discuss a possible way forward. For example, every time Science Alert posts a climate news article on Facebook, “the comment section becomes a hot-pot of climate denialism with astonishing speed and ferocity.” A lecturer from Monash University, Australia, has reported insights into the nature of trolls attacking his report on climate change in The Conversation. Online trolls attacked a woman computer scientist in the US who helped take the first picture of a black hole. India has reported two disturbing trend. India saw the killings of three rationalists between 2013 and 2015, while political leaders have made bizarre claims on ancient knowledge of stem cells and organ transplants. Sometimes a scientific conclusion can be presented to align with the dominant political narrative of a country (India).

Padma Tata
Freelance science writer,

729 Insight talk

Radio dialogues between young students and scientists"¨

Carlos Teixeira
School of Communication and Arts - Sao Paulo University, Brazil

Radio-broadcasting project report of 16 Research, Innovation and Dissemination Centers (RIDCs) that are supported by the Sao Paulo Research Foundation (FAPESP), which resulted in the production of 24 radio programs. The project relied on updating the theoretical method of Tape-Forum, proposed by Mário Kaplún, to enable integration between the actors of the process, teachers and students of public schools, mediator and scientists, and make available on digital media the material recorded, for feedback and/or exchange of information. This project aimed to promote dialogue between young students and scientists, encourage young students to interest for scientific careers, as well as contributing to improve the science perception of society. Most of the interventions were conducted in public schools of cities in the State of São Paulo connected to the four public universities of Sao Paulo and to the REDICs. As the REDICs cover research related to different areas of knowledge of the human, exact and biological sciences, this model of public communication, promoting the dialogue between scientists and young students can be extended to all areas of knowledge, covering all the scientific fields. A small group of 3-6 students, representative of the students, participated effectively in the recordings of the programs, respecting the physical capacity of a radio studio. The most average age of the students was 15 to 17, graduating from High School. The evaluation of the project was carried out in two moments by FAPESP, the first on the occasion of submission and application to financing subsidies and on the occasion of accountability and delivery of scientific report. It was also evaluated by two supervisors who followed the project, professors from the Department of Radiojournalism of the Sao Paulo University. As a next step, it is intended to collect data on the impact of programs on students and teachers.

Luciano Maluly
School of Communication and Arts - Sao Paulo University, Brazil

733 Visual presentation

Dissemination of the Brazilian National Science and Technology Week using Comics

Carlos Teixeira
School of Communication and Arts - Sao Paulo University, Brazil

The Brazilian National Science and Technology Week (NSTW) under the coordination of the Ministry of Science, Technology, Innovation and Communication happen every October each year since 2014. The purpose of the NSTW is to bring science and technology closer to the population. It is expected that the communication of scientific and technological themes, using innovative approaches, can stimulate curiosity and motivate the population to discuss the social implications of science, as well as to deepen their knowledge about these themes and thus promote scientific culture. For the dissemination of the NSTW 2016, "Science Feeding Brazil" and NSTW 2018, "Science to Reduce Inequalities", it were used Comics as the language of communication. The comics were adapted and transmitted in TV screens installed in subways, buses, bus terminals and residential condo in Sao Paulo city. Two publicity agencies were contracted to mediate the contacts with the Sao Paulo Subway and Urban Bus Company, with the Sao Paulo Bus Terminal Company and with the administration of residential condo buildings in Sao Paulo city. São Paulo has about 12 million inhabitants, five million of which use public transport daily, which makes significant the possible impact that the dissemination of the NSTW may have caused. During the NSTW 2016 it were transmitted information about the "Food Guide for the Brazilian Population”, produced by the Ministry of Health. The population was informed that this Guide is accessible online for free. During the NSTW 2018 it were transmitted information about the presence of women and Afrodescendants in the scientific field and in research laboratories, encouraging young women and young Afrodescendants to be interested in scientific careers. Although the projects obtained funding from the Ministry of Science and Technology, it were not enough to include avaliation of impact. It is intended to overcome this limitation in future projects.

Waldomiro Vergueiro
School of Communication and Arts - Sao Paulo University, Brazil

753 Visual presentation

Exhibition: Science communication through comics and cartoons, a new perspective in the field of public communication of science and technology

Carlos Teixeira
School of Communication and Arts - Sao Paulo University, Brazil

Until the publication of the book “Seduction of Innocent”, wrote by Fredric Werthan in1954, starting in years 1940 comics books were a great entertainment business, particularly in the United States. After that comics were transformed into marginal literature. However, in 1992, comics returned to have prestige, when Art Spiegelman was a Pulitzer Prize winner with “Maus”, a graphic novel target to adult public. Currently comic books are recognized as a legitimate way of conveying information. They continues to be widely used as entertainment literature, especially aimed to children and young people. Japan, is an example where comics publications with specific content are directed to target audience as boys, girls, teens male and female, and men and woman adults. Comics have been widely used as a way to adapt great classics of literature and even philosophical and sociological works. However, little is known about the use of comics and cartoons to communicate science and technology. Since 2011 it is organized a comics exhibition science themed with the comics “The scientists” (http://oscientistashq.blogspot.com.br), of the Brazilian cartoonist, the press advisor João Garcia from Institute for Technological Research of the State of São Paulo and the comics “Sciencetoons” (http://www.scientoon.com) of the Indian cartoonist and Phd biochemist Pradeep K. Srivastava, from the Central Drug Research Institute. Comics addressing different fields of science were exhibited at international meetings of public communication of science, such as Workshop Brazil-India (2011, Sao Paulo University), Hands on Science Conference (2012, Antalya, Turkey) and Public Communication Conference (2017, Villa Maria, Argentina). This exhibition was also taken to PCST 2014 (Salvador, Brazil). To PCST 2020 is it intended to expose the latest works produced by the authors, addressing scientific themes not addressed in the 2014 exhibition and that were the subject of both scientific publications and of the mainstream media.

Praddep Srivastava
Central Drug Research Institute - Lucknow, India

João Garcia
Institute for Technological Research of the State of Sà£o Paulo , Brazil

Waldomiro Vergueiro
School of Communication and Arts - Sao Paulo University, Brazil

615 Insight talk

It's about "making" - Civic hackathons as technoscientific public communication/engagement mode

Carolin Thiem
, Germany

In the last decade, civic hackathons transformed into public events that innovated science policy and science communication. The term “hacking” is mostly related to a computer crime, but this is not what it means in terms of civic hackathons. Here “hacking” is related to the distortion of something’s original purpose to solve a problem. At a hackathon event, multiple people from various backgrounds work on one challenge. Via a multiple methods approach I examined different civic hackathons dealing with solutions for the oceans and for cities. I analysed ethnografic and webnograhic data from 6 different hackathons and conducted 8 different interviews (organizers and participants). The initially addressed public for these hackathons was imagined to consist of certified scientific experts, programmers and designers – hoverver inexperienced people with a desire to improve the actual situation (enthusiasts) also participated.

I analyzed the different modes of technoscientific communication and engagement and compare them with different existing and classical modes of science communication and engagement. Therefore I will focus first on how lightning talks transform from scientific lectures into input for a creative hacking processes. Second, I will show that through the making of prototypes, citizens can gain different technological knowledge while using diverse (new) digital technologies or data sets. Further, they develop scientific knowledge regarding the topic (city/ocean) during the prototyping process. While making and tinkering citizens arrange technologies in a new manner, they can also contribute to the production of technoscientific knowledge. Last I will display how the special time frame of two days and the tension between regulation and experimentation keeps the participation at the civic hackathon alive.

In my conclusion I will frame civic hackathons as instruments for public engagement in science - especially for the communication and engagement in technoscience.

1167 Insight talk

Brave Zoom World: Exploring engaged research in a strange, new, physically distanced world

Virginia Thomas
University of Exeter, United Kingdom

Building on the growing consensus across practices of interdisciplinarity and participatory research that collaboration is best fostered via regular sociality and shared problem solving, From ‘Feed the Birds’ to ‘Do Not Feed the Animals (DNFTA) was designed as an experiment in ‘engaged research’ (Holliman, 2017). Investigating animal feeding in the past and present requires sharing theories, insights, methods, and research data across multiple academic disciplines as well as with non-academic partners in the conservation and heritage sectors. The project was predicated on in-person contact and working with objects in archives and museum collections across the country. Before we even had chance to celebrate funding success however, COVID-19 arrived in the UK sweeping all before it and instituting a formal lockdown across the country by 25th March 2020. As with almost every aspect of life, COVID-19 has had profoundly disruptive effects on animal feeding and human-animal relations. This paper discusses these processes of disruption and the creative redesign of DNFTA, in which we have had to accommodate the ongoing uncertainties of the pandemic, the changed circumstances and priorities of our third sector partners, and the need to safeguard the health of all involved. We aim to share our experiences and invite dialogue with PCST colleagues about the challenges of undertaking engaged research in the midst of a pandemic.

This paper will address all three of PCST 2020’s themes:

Time –sticking to a research agenda through periods of lockdown, disruption and restrictions.

Technology – using old and new technologies to continue with a research programme predicated on in person sociality and collaboration.

Transformation – transmuting engaged research to effective interaction at a physical distance, and the ongoing transformation of science communication from ‘deficit’ to ‘participation’ and beyond.

Angela Cassidy
University of Exeter, United Kingdom

1154 Individual paper

Demand for Trustworthiness Information from Science Communicators

Leigh Anne Tiffany
Michigan State University, United States

During a global pandemic, trusting the scientists sharing health-related information is critical. We use a representative survey (n = 400) to better understand the degree to which Americans want science communicators to share information about scientists' trustworthiness in the context of COVID-19. We focus on "demand for trustworthiness" information due to a concern that scientists might hesitate to strategically share trustworthiness information (i.e., information that portrays warmth, competence, openness, etc.) because they worry audiences (a) do not want such information or (b) might see such information as manipulative.

The logic underlying the current study is that scientists cannot take their trustworthiness for granted and thus need to consider devoting some effort to (ethically) communicating relevant trustworthiness information. Our sense is that too much of the current science communication literature simply emphasizes identifying trustworthy communicators rather than seeking to cumulatively build trustworthiness beliefs over time.

Descriptively, the data suggest that respondents see communicating a willingness to listen (i.e., openness) as the trust-related objective that science communicators should prioritize most highly; in a hypothetical 60-minute public talk, this is the objective to which they believe scientists should allocate the most time. In fact, respondents saw communicating a willingness to listen as slightly more important than sharing results and risk-benefit information. Respondents gave relatively lower priority to information about integrity and benevolence (i.e., warmth or motivation), but still clearly indicated that scientists should devote some attention to such topics.

Multivariate analyses were of limited value in predicting respondents' desire for trustworthiness information. Only perceived usefulness of such information was a somewhat consistent and substantive predictor. Demographics, issue concern, and perceived information sufficiency were not consistent predictors. While Americans clearly want trust information, additional work is needed understand what drives this demand.

John Besley
Michigan State University, United States

1096 Individual paper

But does it work? Evaluation, effectiveness and the history of health communication

Elizabeth Toon
University of Manchester, United Kingdom

Health communicators today employ the tools of social science to determine whether their interventions have been successful. Have their messages reached the right targets and conveyed information appropriately? Has behaviour change occurred, and is that change due to their intervention? Is behaviour change the only marker of success? Are changes in knowledge that could someday lead to behaviour change enough to prove a campaign has "worked"?

In this presentation, I draw on historical research to outline how a much earlier generation grappled with many of the same issues. While they never tried to calculate a "weighted mean effect size" for their mass media campaigns, health communicators from the 1910s through the 1940s sought to prove that their efforts were contributing to "“ and maybe even responsible for "“ improvements in the public's health. Early practitioners and academics scoured surveys of attitudes and practices, trends in service use, and even vital statistics for evidence that persuasion could change knowledge, attitudes, behaviour, and eventually, health. Like their descendants today, these experts were often frustrated by what they found: marginal or at least poorly quantified effects, particularly compared to their commercial rivals" ability to sell products and habits.

The ancestors of today's health communicators would soon refine their approaches to both campaigns and evaluation. By embracing social science over showmanship, selling, and hard-won experience as their central claim to expertise, they hoped to prove themselves legitimate contributors to an increasingly academic public health world. Even so, they wondered what this trade-off might sacrifice. Was it enough to have faith that their efforts would someday bear fruit? Did a campaign have to have proven impact to be worthwhile? And what we can learn from their efforts to balance science with enthusiasm, theory with practice, and academic concerns with practical accomplishments?

890 Visual presentation

Science Communications Training: Insights and Review from a Practitioner's University-wide Program

Dana Topousis
University of California, Davis, United States

In November 2016, the Office of Strategic Communications of the University of California, Davis created a half-day science communications training for faculty, graduate students, and post-docs, with a focus on storytelling and messaging, for a nominal fee. What is unique about our program is that it was developed and is run by the Office of Strategic Communications. While other university communications departments provide ad-hoc or regular media training to faculty, we are one of the only universities in the U.S. that runs a program of this stature through its central university communications department.

The scope of our program covers the value of good communications to a variety of audiences—including media, legislators, donors, alumni, and other public audiences. We present data and provide best practices, tools, practice, and individual feedback on how to deliver messages compellingly and effectively.

The author will present key insights about the value of this program after more than three years, including how we have built relationships with faculty to expand our program. She will provide survey results from universities across the United States about the work they're doing in the realm of sceince communication training. Finally, the author will share results of a new leadership program for women faculty in STEAM fields, developed and delivered in partnership between UC Davis Strategic Communications and senior faculty.

As part of this PCST session, the author will provide lessons learned, feedback and data from our workshops, feedback from a faculty advisory group, and details about how we’re working to expand this work in California.

591 Individual paper

Personalities, publics and places in 19th century science popularisation

Brian Trench
Dublin City University, Ireland

The long version of the history of science communication reaches back to pre-industrial times. Through the 19th century, as the figure of ‘scientist’ takes shape, the role of populariser is integrated into it. In the development of this role for the scientist many of the considerations about how popularisation can be, or should be, done prefigure the concerns of our own time. More than that, awareness of this early history offers insights into present practices; the attention that early popularisers paid to speaking style may illuminate performance aspects of current science communication.

This paper examines what it meant to do popular science through the stories of four leading exponents spanning the 19th century: Humphry Davy (and his cousin Edmund Davy), Dionysius Lardner, John Tyndall and Agnes Mary Clerke. Through their own reflections and through newspaper reports and scientific society records we can view the growing publics for science and these popularisers' understanding of their popular role.

In the early 19th century Humphry Davy was a celebrity lecturer whose public talks in Dublin in 1810-11 were the hottest tickets in town. Davy had a notably strong following among women, who were largely excluded from the practice of science.

From being a theme of fashionable social gatherings popular science evolves into a profitable practice. In the 1850s Lardner and in the 1870s Tyndall presented US lecture tours over several months and both they and Clerke had outstanding publishing records, with some of their books appearing in multiple sell-out editions. Clerke was a pioneer among women popularisers, though exclusively as a writer.

With regard to place, the four personalities are linked through being born in or active in Ireland. All four had a significant presence in London. Two of them broke into the US market. Tyndall was published in several European languages.

Brian Trench
Dublin City University,

911 Visual presentation

Science communication practice as a catalyst for science and humanities

Aya Tsuboi
The University of Tokyo, Kavli IPMU, Japan

Kavli Institute for the physics and mathematics of the universe (Kavli IPMU) hosts an Artists in Residence (AIR) program since 2015. Recently one of their artworks based on his resident was awarded the second prize at the Japan media art festival among over 4000 artworks. This program is characterized by the host’s nature – Kavli IPMU being an institution of basic science and around 100 of the world’s top-level scientists gather to reveal the mystery of the universe.

This talk will introduce an unique model that stands in-between a deficit and a dialogue model based on the AIR program, by illustrating three perspectives. Contrary to dominant science communication where the focus is primarily on applied science, it focuses on exploring communication of basic science such as physics or mathematics. Second, it attempts to work as a catalyst for science and humanities rather than dispatching one-way information from the science field. Lastly, it shows an unique attempt to disclose the model itself to the public from the early stage.

These three perspectives are explained in the context of the art exhibition hosted by Kavli IPMU that took place at a gallery in Central Tokyo in 2018 for 2 weeks, which featured the artworks of 3 artists who participated in the AIR program as well as a symposium, a workshop and seminars participated by 15 professionals from multiple fields such as science culture theory, aesthetics and analytic philosophy.

The talk will also introduce the result of the survey conducted among over 300 people who visited the exhibition by asking them to fill in the questionnaire at the venue. Some of the highlights include a diversity of audience the program managed to reach, and a high interest in Kavli IPMU, which result is compared against other surveys of conventional scientific public programs hosted by Kavli IPMU.

596 Insight talk

Branching out: reaching younger audiences and telling the story of plant STEM Careers through technology

Jessica B. Turner-Skoff
The Morton Arboretum, USA, United States

The fields of plant science and horticulture are vital for a myriad of global issues, including food security, conservation of biodiversity, and human health. However, plant blindness, or the idea that people do not appreciate or understand the importance of plants, poses a real challenge in attracting the next generation of plant scientists and professionals. If efforts are not made to engage and communicate with this important audience, we will not have the skilled workforce able to solve these problems. Interdepartmental teams at The Morton Arboretum are transforming how they engage with this audience by using new technologies and storytelling techniques to share the importance, viability, and accessibility of plant careers. Using information derived from a focus group, the Arboretum developed Planted: Finding Your Roots in STEM Careers podcast. This podcast provides an authentic experience with STEM professionals and showcases the opportunities associated with the field. To make this podcast relevant for schools, there are lesson plans that complement each episode; teachers can engage students with the audio content through activities and visuals. In addition to the podcast, the Arboretum created a series of online graphic novels called Canopy Career Chronicles. Teenagers take an online quiz to determine their interests and the interactive platform connects them to graphic novels that highlight the career journeys of diverse plant science professionals. Each of these resources allows the unique personalities of real-life professionals to shine through, creating deeper, more meaningful connections to students. Learn about these two unique resources, the opportunities and challenges of using new media platforms, the process of collaborating with a diverse team of experts, and how to use evaluation methods to improve outcomes. Technology and collaboration are important tools for informal learning centers to use to connect and transform the targeted audiences' knowledge and perception of science.

Meghan Wiesbrock
The Morton Arboretum, United States

Carissa Dougherty
The Morton Arboretum, United States

1155 Insight talk

"We don't know yet, but that's quite usual!" A Qualitative Content Analysis of the Representation of Scientific Uncertainty in German Online Reporting on Covid-19

Tobias Tönsfeuerborn
Bielefeld University, Germany

Scientific evidence is important for dealing with Covid-19. But scientific findings are characterized by uncertainty, especially regarding the novelty of Covid-19. Media coverage of the pandemic therefore should also express the uncertainty concerning scientific findings presented. This is particularly important against the background of trust in both science and the media.

This exploratory study examines how scientific uncertainty is represented in Covid-19 reporting of six major German print media's online subsidiaries between March and June 2020. It uses qualitative content analysis to categorize the relevant aspects represented in the context of uncertainty primarily from the material, but also from theoretical assumptions.

The goal here is to develop a typology of uncertainty representation for the specific case of Covid-19 reporting. Given its urgency, the case is not representative for uncertainty communication in general.

The analysis is still in progress, but the main categories are already available.

The first is the presented reason for the uncertainty. Such reasons found in the material were the novelty of the virus, disagreement in the scientific community, and the general incompleteness of scientific knowledge.

Another relevant aspect seems to be whether uncertainty is presented with reference to scientists. If such a reference is present, a distinction can be made between scientists who are involved in the research in question and those who judge the results from the outside.

Furthermore, the analysis shows a distinction regarding the evaluation of presented uncertainty: Is uncertainty presented as normality in science, problematized or even scandalized?

Finally, an analysis of the consequences of uncertainty described in the respective articles is indicated. So far, these include the presentation of the necessity of further research, the problematization of expectations of science, and appeals to trust in science despite uncertainty.

Further analysis will now use these categories to develop a typology of uncertainty representation in the specific case of Covid-19 reporting.

569 Insight talk

How to bring 60 nerds together on a stage?

Veli Vural Uslu
AgroScience GmbH AlPlanta-Institute for Plant Research, Germany

One of the biggest challenges of science communication is to bring the laymen, who are not interested in science, and the reseachers, who are not interested in laymen, together. In order to engage researchers in science communication and to engage the public in science, a theater based experiment, which I initiated four years ago, can serve as a successful model platform.

This project, SciComHD, began with a few random researchers, who saw the SciComHD advertisement posters in the university campus. After a few rounds of simple stage training, the rehearsals turned into an ever growing platform where researchers could express their daily frustrations –sometimes very vividly. With the plenty of stories that researchers brought in from their laboratories, we wrote and performed several theater plays such as ‚Romeo and Juliet in the Lab', where Romeo and Juliet are two PhD students who fall in love at a conference and their competing bosses do not let them be together. In parallel, the actors also participated in a new format of science communication and talked about their actual research in a theater set up or they just danced their research on the stage.

So far, this project has gathered more than 60 scientists from 30 countries and we performed 12 different theater plays and several dosens of shows. The tickets were sold out in almost every single show and we manage to reach out to several thousands of people. All of these projects run with no external funding and in a non-profit basis to be a sustainable model even for low budget or no budget local initiatives in the future. Altogether this fun experiment demonstrates that such theater based projects can be a successful model to encourage the scientists for reflecting on their extraordinary research and ordinary lab life to non-scientists.

1083 Visual presentation

Sickle cell disease - the patient's perspective

Sophie Uyoga
KEMRI Wellcome Trust Research Programme, Kenya

Sickle cell disease (SCD) is an inherited red blood cell disorder that results in the formation of abnormal haemoglobin. There are over 300,000 children born with SCD every year with most births occurring in sub-Saharan Africa. There is currently a lot of scientific research on the disease, and it is important that the researchers have a better understanding of what the patients experience in this community, and their views on the on-going research in order to develop a better working relationship with the research participants.

We have conducted 4 focus group discussions (FGDs) and 2 in-depth interviews (IDIs) with the patients and their caregivers to share experiences. The discussions highlighted the challenges and successes that the affected families experience. We also visited 7 homesteads for the contextualization of the key messages generated from the discussions. The content for the 28-page comic book that we have developed has been drawn from their experiences and will be targeted for children aged 7-14 years attending the sickle cell clinic to aid their understanding of the disease at an early age. We also have used our school engagement programme to distribute the comic book at the local schools where the patients come from as a way of creating awareness about the disease.

The presentation will showcase the comic book and highlight the use of engagement activities to develop awareness materials that will raise the profile of the social issues and challenges that people living with SCD experience.

828 Demonstration

Educating science communicators in / after the COVID era

Frans van Dam
Utrecht University, Netherlands

Online courses offer flexible modes of study, allowing science communication practitioners to learn about research who wouldn't normally have the opportunity, such as those who are outside the country or lack the time to attend conventional courses. On campus, when integrated into 'face-to-face' courses, online modules help students to be better prepared. Instead of meeting briefly each week, an online learning class becomes an ongoing community. Moreover, in the COVID era, lecturers and students worldwide have experienced the possibilities and challenges of online learning.

New questions

Online education introduces new questions, about the benefits of face-to-face contact, the pros and cons of synchronous and asynchronous teaching, questions about course fees and how connections between participants. Moreover, teaching online requires a thorough revision of a course.

Sharing experiences

At the same time, online learning enables easy exchange of course modules. In this demonstration, three lecturers share their experiences in designing and delivering online courses on science communication. And what are the lessons learned for the post-COVID era?

Programme

For science communicators in southern Africa, Marina Joubert has been teaching a six-week introductory science communication course for the past five years. Andy Ridgway delivered an online continuing professional development course in science writing attended by participants from around the world. Frans van Dam recently developed a course in public engagement in which students design an activity for a researcher. The speakers will briefly demonstrate their experiences in the context of communication and education theory.

In the second part of this session, groups of participants will generate ideas on areas of science communication research that are difficult to cover in face-to-face teaching but could be covered effectively in an online programme; thus, transforming their course curricula. They will also be asked to consider how online learning could further improve in / after COVID times.

Marina Joubert
Stellenbosch University, South Africa

Andy Ridgway
UWE Bristol, United Kingdom

918 Insight talk

Discussable complexity in science communication through form language

Maarten van der Sanden
Delft University of Technology, Netherlands

In a volatile, uncertain, complex and ambiguous (VUCA) world the discussion on complexity is inevitable. However, this interaction is often hampered by a mutual misunderstanding of what the other means by complexity at hand. Diffuse debates on HPV vaccination exemplify this awkwardness in which multi stakeholders and many emotions are both intensely interwoven and fiercely contested.

It is widely known that humans not only understand this complex reality through interaction with others, but actually by using all their senses. Through speech, a sense of touch, vision, sound, people obtain an idea of the whole by bringing their known and felt knowledge together. Likewise, mostly natural scientists make use of 3D-models, and abstract figures to explain or discuss the complexity of e.g. protein folding. However, when the challenge lacks a physical appearance these go-to ways to understand complexity fail and we’re back to relying on words to feed the discussion. A language based on form and space, using properties as ‘proportion’, ‘rhythm’ and ‘scale’ rather than words seems to fill this gap.

Looking at how architecture communicates in a more intuitive way through experience, rather than symbolic meaning, we created a ‘form language’ that invites the user to envision the complexity they feel when they think about e.g. the complexity of the vaccination debate. The various materials as well as the pyramids, spheres and cubes of this language support people to talk, touch, see and feel their mutual complex challenge through the shared imagination of what each form means to them.

Testing the form language with professionals and university students showed its great potential in supporting discussions on complexity and the creation of the team. During the insight talk we would like to showcase these results by a short demonstration of such a discussion obtained from our own research and design practice.

Anne Kamp
Vormtaal / Delft University of Technology, Netherlands

1098 Individual paper

Science Communication policies in Brazil: understanding who the communicators are attending to government's public calls

Iara Vasconcellos
University of Sao Paulo, Brazil

From 2002 to 2016, during Workers' Party governments, Brazil experienced an increase of redistributive public policies. Government's programs were intended to broaden the participation of the population in Science by increasing the access to universities and creating exchange programs. The Science Communication field was benefited with a series of public calls for the promotion of Science Communication. For this work, six of those calls were selected, from 2003 to 2013: three universal calls and three for the creation or actions for Science Centers or Science Museums. 3.547 submitted projects were analyzed, through data gathered by the Brazilian Freedom of Information Act. It was possible to identify the gender of the projects' authors, the institution in which they were employed, the field of knowledge of the project, city in which they took course and the budget requested and approved. In this unprecedented research, we can recognize concentration of Science communicators in the Southeast (with 1.578 projects submitted, against 714 from Northeast, the second with more projects) and the concentration of authors employed at universities (75% of them). A closer look reveals the difficulties of this kind of actions to be made out the major urban centers, once only three states have as much projects in the country as in the metropolitan regions. The difference between the projects submitted by men and women reflects Brazilian gender issues. Men, that are 54% of the professors at universities, are 60% of the submitted project's authors. The policy developed was intended to broaden the participation of the population in Science, however as it was built using the existing structures of science and technology, it excluded the all the territory that wasn't attended by those structures. We can preliminarily conclude that the policy sustained the inequality already existing.

Alessandra Bizerra
University of Sao Paulo, Brazil

Rodolfo Bezzon
University of Sao Paulo, Brazil

Bruno Cerqueira
Federal University of ABC, Brazil

559 Individual paper

Participatory Co-Design of Science Communication Strategies for Public Engagement in the US and Ecuador around Health Behavior Change

Denisse Vasquez-Guevara
University of Cuenca, Ecuador

This multiple case study was developed through analyzing two research programs that promote healthy nutrition and physical activity habits for children - one in the US and one in Ecuador- to motivate public engagement and collaboration among researchers and their publics. The outcomes of this study provide several guidelines for science communication practitioners and researchers that seek to work with young audiences.

The methodological design combined participatory action research, qualitative research, decolonial epistemologies, and an analytical framework using a combination of media theories (two-step flow, framing, and medium theory). This research design enabled the collaboration of researchers and their publics to co-design science communication strategies focused on adopting healthy habits.

Results

In the US, the results indicated the importance of taking into consideration the relationships among cultural, economic, and environmental factors that come into play for children and their families when proposing new engagement activities and resources. Consequently, the newly-designed science communication strategies proposed peer health education and informational resources through social media. Additional strategies were geared toward facilitating access to healthy food by developing vegetable gardens and pantries in schools.

In Ecuador, the results evidenced the need to provide a more interactive approach through online resources and offline outdoor activities that promote dialogue among researchers and their publics. These findings led to co-designing an app, developing social media resources, and creating informal events that unite families around physical activity.

Contributions

This study provides methodological guidelines for science communication for public engagement conducted through participatory action research. Moreover, it provides procedural recommendations for building trust among researchers and their audiences; and using participatory data collection tools to co-design science communication strategies, messages, content, and selecting appropriate communication conduits/formats to motivate audience engagement.

David Weiss
University of New Mexico, United States

Judith McIntosh White
University of New Mexico, United States

936 Individual paper

Knowing what you don't know: Does explaining a science article affect Individuals' assessment of their own and scientists' knowledge?

Nina Vaupotic
University of Münster, Germany

Online media has become the main source of information for laypeople wishing to inform themselves about science (Su et al., 2015). However, knowledge nowadays is highly specialised and often too difficult to fully understand without lengthy (academic) education (Bromme & Goldman, 2014). Online science information is therefore usually written in a simplified and easily comprehensible manner, which could give laypeople an unrealistic confidence in dealing with the respective scientific topic (Scharrer et al., 2012).

The present experimental study wished to investigate how individuals assess their own and scientists' knowledge about a scientific topic before and after engaging with an online science article in one of the two ways: reading or reading and explaining. Altogether, 168 adults were asked to read an online science news article about algorithmic predictions of severe weather events. Afterwards, half of the participants were additionally asked to give an explanation to a friend who knows nothing about the topic.

Before and after engaging with the science article, participants assessed scientists' knowledge to be significantly higher than theirs ($F(1,167)= 479.1$, $p < .001$). After engaging with the science topic in either of the two ways, participants assessed their own knowledge as well as the scientists' knowledge as significantly higher than beforehand (($F(1,167)= 121.9$, $p < .001$)). The type of engagement (reading vs. reading and explaining) did not differentially influence participants' own knowledge assessments, however, the gap between the assessment of own knowledge and scientists' knowledge was significantly larger when participants additionally explained what they had read (($F(1,167)= 8.359$, $p = .004$)). The explanations given by the participants often contained factual information and were written in a summarizing manner. Our results give some insights into laypeople' s perception of their own knowledge position in a world in which knowledge is difficult to understand but easy to access.

Dorothe Kienhues
University of Münster, Germany

Regina Jucks
University of Münster, Germany

848 Insight talk

Grab a drink and talk science: How scientists adapt their talks for an informal science communication event

Nina Vaupotic
University of Münster, Germany

Science communication, which has left the boundaries of formalised classroom settings is increasingly taking place at informal events. This raises the question of how scientists prepare for such dialogue, and how they adapt their communication in line with their anticipation of the audience. We investigated scientists' approach to overcoming the barriers of communicating their highly specialised work to a public that likely possesses only limited relevant knowledge (Bromme & Goldman, 2014). While some previous studies focus on surveying attitudes and communication objectives of scientists (Dudo & Besley, 2016), we were interested in scientists' adaptations to the expected lay audience, namely adaptations regarding theory, methods and results as well as scientific uncertainties and practical implications. Furthermore, we were interested in scientists' reasons behind these adaptations.

The present interview study was conducted in the context of a science communication event (SCE), during which nine scientists from different disciplinary backgrounds presented their work in separate 45 minute talks. The interviews were conducted before the SCE took place to capture scientists' prior perceptions and planning of the anticipated communication. A qualitative content analysis (Mayring, 2010) was used to develop a coding scheme of scientists' communication adaptations for the lay audience. Almost all scientists mentioned adaptations such as reducing information regarding methods, focusing on the main results or using simplified language. These were motivated by time constraints or an anticipated lack of knowledge and interest of the audience. While some scientists mentioned wanting to foster an active role of the public in judging their research, a few others completely refrained from explaining the methods and scientific uncertainties underlying their research. We discuss these results from the perspective of scientists' disciplinary backgrounds and their understanding of science, as well as provide implications for scientists who adapt their public communication when speaking to a lay audience.

Friederike Hendriks
University of Münster, Germany

Lukas Gierth
University of Münster, Germany

Dorothe Kienhues
University of Münster, Germany

595 Insight talk

Let's rethink the tools for Scicomm evaluation

Empar Vengut Climent
Institute of Welfare, University of ValÃ¨ncia, Spain

Science communicators spend a lot of time planning and delivering their activities. Lately, there has been an increased interest in knowing whether their efforts are worthy and if they have an impact. For this reason, different evaluation methods have been developed to assess the success and effectiveness of science communication.

Online metrics and questionnaires are the main evaluation tools for online and social media communication. The number of attendees usually measures the impact of face-to-face activities; and questionnaires and other evaluation methods can also be used to check whether the outputs and outcomes were reached. However, one of the biggest inconveniences of surveys and questionnaires is the lack of time the communicator and the audience have to conduct the evaluation.

In this regard, technology can lend us a hand, especially when evaluating activities addressed to young people. PERSIST_EU consortium created an ICT platform that allows measurement of the change in knowledge, perception, beliefs and trust, among young people, in four of the current scientific hot topics: climate change, vaccines, GMOs and complementary and alternative medicine (CAM). This tool has been validated with nearly 500 university students from 5 countries: Italy, Portugal, Slovakia, Germany and Spain; and it is available for its free use in six different languages (Italian, Portuguese, Slovak, German, Spanish, Polish and English).

The results of the validation activities were encouraging, and we hope this platform can be also used as the basis for the creation of other customisable tools for the assessment of Scicomm activities. Namely, we think this kind of evaluation could be implemented in mobile apps, already used in conferences and other activities. If we are carrying on scicomm activities, why not involve the audience in their evaluation by acknowledging they are a part of research?

Carolina Moreno-Castro
Institute of Welfare, University of Valà¨ncia , Spain

Isabel Mendoza-Poudereux
Institute of Welfare, University of Valà¨ncia , Spain

Ana Serra Perales
Institute of Welfare, University of Valà¨ncia ,

818 Insight talk

Tragic Stories: a new session format for PCST 2022. Only for the brave.

Alex Verkade
PCST 2022 / VSC, Association Science Centres and Museums, Netherlands

This practice insight session will feature a Tragic Story about failed science communication; and a crash course in storytelling theory.

PCST members know a lot about engaging forms of communication. Yet many conference sessions are a collection of dry statements against a background of PowerPoint. The organizing committee of PCST 2022 aims to make the 2022 conference a more varied and engaging experience for all. We will challenge participants to share their expertise in new, unexpected ways.

We will introduce a number of innovative session formats, next to more traditional ones. In Aberdeen, we showcase some of the new formats.

In this session we showcase possibly the most challenging, yet most rewarding of the new formats: Tragic Stories. In a Tragic Stories session at PCST 2022, a speaker will tell a captivating story about a personal journey with its share of failure.

Tragic Stories builds on two key insights:

Storytelling can be a powerful way to engage an audience.
Failure is instructive. We learn from mistakes.

I have engaged in a number of Confession Sessions myself. In these, I have shared with colleagues many failures. As a speaker, sharing your mistakes can provide comfort. As a listener, you can avoid making the same mistakes in the future. As a community, we build a culture of openness and learning, thereby stimulating progress. Together, we engage in iterative innovation: try, fail, improve, try again.

The Tragic Stories format will stimulate exchange in our own community of experts. At the same time, it will provide science communicators with a new tool to communicate science. Failure is an essential part of the scientific process. Tragic stories can address that, and highlight the common humanity that audiences share with scientists.

Also, success stories are BORING. Celebrate failure!

Frank Kupper
PCST 2022 / VU Amsterdam, Netherlands

Maarten van der Sanden
PCST 2022 / TU Delft, Netherlands

Henk Mulder
PCST 2022 / Rijksuniversiteit Groningen, Netherlands

Marieke Baan
PCST 2022 / UvA, Netherlands

837 Visual presentation

NEW AND IMPROVED! Get to know all the innovations for PCST 2022

Alex Verkade
PCST 2022 / VSC, Association Science Centres and Museums, Netherlands

In this video the PCST 2022 organising committee will showcase all the new formats and programs that they will introduce at the 2022 conference in Rotterdam, the Netherlands.

New session formats; new conference roles for experts; new social programs; a collaborative artwork; online and offline meetups leading up to the conference; PCST 2022 in Rotterdam will feel like a whole new conference. And what are these Secret Off Menu Sessions?

The organizing committee of PCST 2022 aims to make the 2022 conference a more exciting, varied and engaging experience for all. We have a lot of innovations in store. We will challenge participants to share their expertise in new, unexpected ways. And we will stimulate you, the PCST community, to find common ground not just at the conference, but continuously throughout the period leading up to it. We aim for more engagement, a stronger community, and, ultimately, better science communication. And we need your help.

In this video, members of the Rotterdam 2022 organizing committee will introduce our new session formats, the role of theme curator and some surprising programs and roles you will be able to submit proposals for.

At the same time, you will get to know the faces that belong with the names, the ideas behind the innovations, and the secrets behind the scenes of the next PCST conference.

Anticipation is half the fun. We hope to get you thinking about all the possibilities and opportunities that PCST 2022 will open up, and we hope you will come find us in Aberdeen to exchange thoughts.

Frank Kupper
PCST 2022 / VU Amsterdam, Netherlands

Maarten van der Sanden
PCST 2022 / TU Delft, Netherlands

Henk Mulder
PCST 2022 / Rijksuniversiteit Groningen, Netherlands

967 Individual paper

Public perception of climate risks: following Web communication trails during urban floods

Rosa Vicari
HM&Co Lab / Ã‰cole des Ponts ParisTech, France

When climate hazards affect a city, environmental and physical impacts can be detected during and after these events. Similarly, social consequences of climate extremes, such as the public perception of climate change, can be observed. In the era of the interactive use of the Internet, huge numbers of Web data are spontaneously produced by the population during an extreme weather event. These “digital trails” can provide insight into the interactions existing between climate-related risks and the public attitudes towards these risks. According to this research, recent advances in computer-aided exploration of Web communications can be exploited to monitor these interactions, and contribute to the research on communities' climate resilience.

The authors led a range experiments that show how digital research can be employed to identify key issues covered by digital media during a major flood, identify potential gatekeepers who can influence the debate, and describe how these actors and topics form debate clusters. Three corpora of Web communication data were extracted: press articles and tweets on the 2016 Seine River flood, and press articles covering the 2015 Alpes-Maritimes flood.

Through this analysis we detected topics and actors that characterise each press dataset, as well as frequent co-occurrences and clusters of topics and actors. Profiling of social media users gave us insights into who could influence opinions on Twitter. Through a comparison of the three datasets, it was also possible to observe how some patterns change over time, in different urban areas, and in different media contexts.

The results of this study are presented in R. Vicari, I. Tchiguirinskaia, D. Schertzer, B. Tisserand, Climate risks, digital media, and big data: following communication trails to investigate urban communities' resilience, Natural Hazards and Earth System Sciences Journal, doi.org/10.5194/nhess-19-1485-2019. This research was supported by the Chair Hydrology for Resilient Cities (endowed by Veolia).

Ioulia Tchiguirinskaia
HM&Co Lab / École des Ponts ParisTech, France

Daniel Schertzer
HM&Co Lab / École des Ponts ParisTech, France

915 Roundtable discussion

Training for the future: Teaching science communication and new media

Samantha Vilkins
Australian National University, Australia

How do we train new science communicators to work in a rapidly shifting digital landscape?

Scientists and science communicators are increasingly reliant on social and new media in their work, which presents both benefits and challenges for engaging with others.

While success stories can be easy to see, designing an environment where each student comes away with experience and enthusiasm is difficult when starting up against big publishers, paid sponsorships, and algorithmic content controls. Such issues also compound differently across the globe. Technological advances and digital freedoms vary dramatically from country to country, and data privacy initiatives such as in the EU show the difficulty of standardisation across digital and political borders. Our teaching, too, may not translate as universally as we assume.

How can we best prepare new science communicators? Can we embed optimism and ethical perspectives when working in such spaces — now, and into the future?

This panel brings together international experience in teaching, research and practice in new media to speak on broad issues across learning foundational digital skills, building trust online, and how communities engage and disengage under changing technological regulations and restrictions.

The panel is chaired by Samantha Vilkins, lecturer for the undergraduate and postgraduate course Science Communication and the Web at the Australian National University. She is joined by Professor and Chair of Life Sciences Communication at the University of Wisconsin-Madison Dominique Brossard, Professor Sarah Mojarad from the University of Southern California, Digital Society Fellow at The University of Reading Dr Erinma Ochu, and Kim Trollip of the Human Sciences Research Council of South Africa.

Join us as we discuss not only what skills are required today, but how we can prepare students to think big with future media, and how our training needs to adapt.

Dominique Brossard
University of Wisconsin-Madison, United States

Erinma Ochu
The University of Reading, United Kingdom

Sarah Mojarad
University of Southern California, United States

Kim Trollip
Human Sciences Research Council of South Africa, South Africa

1163 Insight talk

University engagement in the Covid-19 Pandemic: the experience of the Communication Office for Outreach and Culture of the University of Campinas in Brazil

Gabriela Villen
Unicamp, Brazil

Based on the experience of the Communication Office for Outreach and Culture of the University of Campinas, in Brazil, this paper analyzes the dimensions of the university's engagement with society since the Covid-19 outbreaking. Almost every research group, laboratory, and school turned towards helping society to cope with the crises. Everywhere, interdisciplinary initiatives were brought together to understand the virus and all the economic and social problems taking place and to come. The Communication Office for Outreach and Culture had a key role in giving visibility to those initiatives, as much as in helping them be carried on virtually. A video report series tried to bring some of those actions to the public. Our cultural branch has also been called on stage. Society needed art and culture. As much as artists were willing to express themselves. Visual arts exhibitions, cultural workshops, and art festivals were produced 100% online. Our social media accounts also had to produce special content and seek specific language to spread the content successfully in each media. This insight talk may contribute to other communicators facing the same challenges, as well as for mapping outreach experiences and enhancing the university's actuation in a pandemic context.

Rossilho Marilisa
University of Campinas, Brazil

779 Individual paper

Science and expertise under fire: the emerging threat of censorship

Esa Väliverronen
University of Helsinki, Finland

Restrictions to the freedom of science and the public expression of researchers have become more prominent around the world in the last decade. In this presentation, we will analyse the academic freedom and freedom of expression of researchers in the context of authoritarian populism. Our focus is particularly on the increasing online hate, aggressive feedback and the politically motivated disparagement of science and expertise .

With recent international examples of the suppression of research as well as the silencing of scientists as public experts, we aim to provide an analytical framework to gain an understanding of the suppression of scientists in these turbulent times.

Our particular focus is in Finland. The presentation is based on three web surveys conducted among Finnish researchers in 2015, 2017 and 2019. We will focus on answers on the open-ended questions in these surveys, where respondents reflect upon issues of freedom of expression and the feedback they receive in public arenas.

Building on previous research on academic freedom, ‘research silencing’ and the ‘chilling effect’, we discuss the connection between freedom of expression and academic freedom. We make a distinction between four forms of hidden censorship: political and economic control, organizational control, control between rival academics and control from below, e.g. from ordinary citizens. Moreover, we make explicit and discuss the means, motives and practices of hidden censorship within each of these four forms.

Sampsa Saikkonen
University of Helsinki, Finland

1133 Individual paper

Trust in science and expertise during the COVID-19 crisis in Finland

Esa Väliverronen
University of Helsinki, Finland

The presentation is based on two kinds of data. First, we have made three consecutive representative surveys (from April 2020) of Finnish adult population (information sources, trust and perceptions of expertise). Fourth survey will be made in April 2021. Secondly, we have gathered extensive social media data, mainly from Twitter and discussion platforms. Our focus is on the public contestation of science and expertise on from the beginning of the epidemic.

In the end of February 2021, there were a total of 742 deaths associated with COVID-19 in Finland, and the number of reported cases was 56 407. Thus, so far, Finland has managed the epidemic fairly well, similarly to other Nordic countries, Norway, Denmark and Iceland, and much better than Sweden, which adopted a different strategy related to COVID-19. High trust in institutions is often presented as one the main reasons for the success in mitigating the pandemic.

However, despite the relative success, Finnish health authorities — represented by the Finnish Institute for Health and Welfare, Finland (THL) and the Ministry of Social Affairs and Health issues (STM) in Finland — have been often questioned in public discourse during the epidemic.

The first results of the surveys reveal that despite of the criticism, the general trust on THL as well as other scientific institutions and experts remained high since Spring 2020. However, there are some interesting differences on the level of trust and perceptions of expertise, based on age, gender, level of education, and particularly, on political orientation.

757 Individual paper

Growing science communication in developing regions

Graham Walker
CPAS, Australian National University, Australia, Australia

We often ask what, but here we ask where is the future of science communication? One third of the world's population is predicted to be living in Africa by 2050, however, with respect to science centres, as a whole Africa is being left behind. This session shares research on science communication capacity building in Africa, along with developing a theoretical base for such by synthesising models from development studies with those from science communication.

15 participants from Southern and East Africa (a small but representative sample given the sector's size) in a science communication capacity building program focussed on science centres and outreach were investigated using traditional needs-based and contemporary asset-based development conceptualisations. These development theories parallel deficit and participatory approaches, respectively, within science communication and demonstrate synergies between the fields. Along with theoretical common ground, science communication plays a key role in the practicalities of development including progressing the UN Sustainable Development Goals – in this way science communication needs to be part of creating a sustainable future.

Data showed staffing, funding, governments, host institutions, and audiences are prominent needs and assets, networks are a major asset, and identified other influential factors. Analysis suggests a model for growth involving coordination on three-levels: (1) individual 'pioneers', (2) host institutions such as universities, cultural museums and research organisations, and (3) government policy and associated departmental capacity.

Case-studies showing this model in action from Africa and the Pacific Islands will be shared, along with discussion of how developed countries and established science communicators can play a constructive role – a practical outcome from the session will be connecting PCST delegates who are interested in capacity building with suitable programs and partners in Africa and/or the Pacific.

Kenneth Monjero
KALRO Science Centre Kenya, Kenya

Bhamini Kamudu
Rajiv Gandhi Science Centre, Mauritius

763 Individual paper

Make it relevant? Engage emotionally? Motivating publics in a science communication experience

Graham Walker
CPAS, Australian National University, Australia, Australia

Science communicators often stress the need to make messages ‘relevant’, or engage with people on an ‘emotional level’, but what do these terms mean, and if communication has these qualities from publics’ perspectives, what effect does it have? Understanding this at the individual level underpins transforming science-society relationships.

Relevance is critical to impactful communication, however specific in-depth research on relevance is limited in science communication, except in the science-policy space (e.g. Cash et al., 2003). Recent research in educational psychology conceptualising relevance as a continuum from personal association, to personal usefulness, to identification (Priniski et al., 2018) or as the connection between content and identity (Hartwell & Kaplan, 2018) – this latter model validated in a biology context – may be helpful for science communicators. Similarly, emotions are central to effective science communication (Davies & Horst, 2016), however as a field we are only beginning to rigorously investigate which emotions are critical and in which contexts (e.g. Yeo, Sun, McKasy, & Shugart, 2019).

This paper shares research on the relationship between relevance and emotion (curiosity, surprise, interest and enjoyment) and resulting motivation during a science communication event. The research quantitively measured these variables during a series of youth-focussed science presentations (n=342), then modelled relationships with the aim of establishing which factors were associated with motivating audiences and transforming their intended behaviour. Relevance was critical, and emotions including surprise and curiosity had significant effects, though others did not. The findings suggest specific areas for science communicators to focus on if their primary aim is to motivate.

As science communication moves towards participatory models with greater involvement of publics, understanding better how people judge relevance in science and its communication, and the role of emotional reactions, are key areas to explore if our work is to transform individuals and societies.

563 Individual paper

From Food to Politics: Representations of genetically modified organisms in cartoons on the Internet in China

Guoyan Wang
Soochow University, China

Problems around genetically modified organisms (GMOs) are becoming increasingly acute in China. To better understand the situation, 257 GMO cartoons were collected from various Chinese online sources. The comics collected were mainly published between 2013"“2017. Image coding was completed independently by five, well-trained graduate students, according to the following variables: figures in the picturesï¼Œstory contextï¼ŒGMO carrier, scary information attitude to GMOs, source of comics, and theme. The validity test result showed that the coders"overall coding consistency reached 92.8%.

From the perspective of content, it was found that 84.5% of the cartoons involve genetically modified (GM) food, mainly plant-based food, and 62.9% of the cartoons present food consumption environments. "To eat or not to eat GMOs" is an issue of common concern in China.

The Chinese media and the public are demonstrating increasing skepticism of and opposition to GMOs. Only 15% of the total samples of comics show GMOs in a positive light, and, while the mainstream media are fairly neutral, social media tends to present more hostile views. In terms of theme, mainstream media tend to present the dilemma in choice but also promote GMOs, while social media posts mostly focus on the themes of health risks and conspiracy theories.

The tendency to politicize GMOs has been vividly depicted in many Chinese GMO comics. Controversial topics such as the "golden rice" incident and the return of GM maize in the United States have provided space for political conspiracy theories to spread. Scientists supporting GMOs have been criticized by the public under suspicion of betraying their country. The issue of GM food in China, therefore, reflects strong political problems.

Lingfei Wang
University of Science and Technology of China, China

960 Visual presentation

#finaltrashtination

Franzisca Weder
University of Queensland, School of Communication and Arts, Australia

In this presentation, my current ecoculture jam #finaltrashtination is presented as higher education assignment and intervention in science communication that carry the potential to provide learners with the tools to use communication frameworks and acts not only to critique the abovementioned status quo but also to collaboratively generate transformation (Milstein & Pulos, 2015, p. 395; Woodside, 2001; Nome, 20012; Dery, 1999). Such acts of jamming dominant environmentally destructive ways of being integrate a variety of interesting communication strategies to engage the public in raising awareness about environmental problems, as well as solutions, using creative means to “create cracks in underlying systems of power, and to promote unsettling moments of reflection and debate” (Milstein & Pulos, 2015, p. 397; de Certau, 1988). The ecoculture jam presented with a short film took place at a European University, where the University's 2-week-plastic waste was unfurled in front of the University's main entrance and then built into walls in the front hall. People entering the University were asked to take some waste and help to "build the wall", additionally conversations were stimulated. Herewith, the ecoculture jam stimulated a “crack” in existing patterns of behavior and consumption as well as reflections of (un)sustainable behavior.

956 Insight talk

Sustainability as Cognitive Friction: A narrative approach to understand moral dissonance of sustainability and harmonization strategies

Franzisca Weder
University of Queensland, School of Communication and Arts, Australia

In increasingly global hyperconsumption cultures, sustainability is not only a wicked problem (Weder et al., 2019; Davis et al., 2018; Murphy, 2012) but also a welcome vehicle for corporations to communicate about the advantages of products and services, often in misleading (Cox, 2013, p. 289) and “greenwashing” ways (Elving et al., 2015). As well, in news reporting, sustainability is increasingly used as master frame, buzzword, or catchphrase (Weder et al., 2019) without explanation, direction, context of sustainability as transformation or, therefore, impact on individual behaviour.

Narratives represent storied ways of knowing and communicating, thus, have always been a key feature in media and communication research. In our contribution, a new version of a narrative inquiry is introduced to capture reflections on experiences of sustainability as well as individual assessments of (un)sustainable behavior over time. We perceive storytelling as an action, as act of problematization which uncovers cognitive dissonances that appear on an individual level dealing with sustainability as process of societal transformtion and related communication. Using Rory’s Story Cubes® (dice with pictograms), we stimulated 35 interviewees from various cultural backgrounds (Asian, European, Anglo-American) to “story” and tell sustainability related life events into order and meaning. Our evaluation of the interviews focused on the story as a whole, which was then linked to the individual biographical background to understand motives for and moral conflicts about (un)sustainable behavior. As well, it was possible to trace back the origin of the dissonances in the abovementioned lack of information and 'overmoralization' of sustainability in news reporting and marketing communication.

In this paper, we want to put the innovative form of a narrative inquiry up for discussion for scinece communication research in better understanding individual perceptions of sustainability and cognitive friction occurring in relation to sustainability related issues.

Amornpan Tungarat
Alpen-Adria University Klagenfurt, Austria

Stella Lemke
Lübeck University , Germany

792 Roundtable discussion

More than a play: Exploring engagements with science theatre

Emma Weitkamp
UWE, United Kingdom

Recent years have seen a burst of interest in theatre that engages with science themes, whether that is widely regarded plays such as Michael Frayn's Copenhagen performed in national theatre venues, or bespoke performances addressing topics of community interest in venues ranging from science museums and festivals to schools. The assumption underlying much of this interest is that theatre will engage the hearts and minds with science in a way that factual representations cannot. Thus, theatre is seen as offering an opportunity to reach out to audiences who might not otherwise take an interest in scientific issues. This roundtable discussion seeks to engage critically with the diversity of science themed theatre, whether that is diversity in the ways in which such performances arise and the theatrical styles they adopt, the different spaces they occupy and what we know about the publics they attract and their impact. In this sense, it will bring different perspectives on the theme, coming from both practice and research experiences, from different parts of the globe. It will critically consider the ways in which science theatre engages publics in debates about inclusion and diversity in science and raises cultural and science capital; it will explore community engagement in health through drama in low-income contexts; the contribution of participatory theatre to public dialogue and the extent to which it contributes to the democractising of science and technology; and the concept of translation will be considered in the context of science theatre. Ultimately, the intention of the panel is to present and analyse a spectrum of approaches, audiences and levels of participation – from professional shows to community-led, participatory theatre that aims for deep, reflective engagement – and to stimulate discussion around when and how these approaches can be used to achieve engagement aims.

Carla Almeida
Museum of Life, Oswaldo Cruz Foundation (Fiocruz), Brazil

Frank Kupper
Athena Institute, Faculty of Science, Vrije Universiteit Amsterdam, Netherlands

Hien Tran Minh
Oxford University Clinical Research Unit, Vietnam

Sergio De Regules
¿Cómoves? Magazine, Dirección General de Divulgación de la Ciencia, Universidad Nacional Autónoma, Mexico

590 Visual presentation

Using Virtual Reality to Communicate Cancer Research

Lisa Whittaker
, United Kingdom

Using Virtual Reality (VR) in cancer care and research has gained attention in recent years. VR interventions have been shown to improve wellbeing and decrease psychological problems associated with cancer (Chirico et al. 2016). VR has also been used as a distraction therapy during cancer treatments such as chemotherapy (Gershon et al. 2004) and as an aid to surgery planning and training (Erin, 2015).

We did something slightly different. We used VR as a tool to communicate vital cancer research being conducted in Wales funded by Tenovus Cancer Care. This is an innovative way to use the latest technology to engage the public by letting them (virtually) step into laboratories where cutting edge science is taking place. Our first VR experience in 2018 starts in a charity shop and takes the viewer to a lab, showing how a simple donation gets turned into lifesaving cancer research. We let staff, volunteers and customers in our shops watch the VR film. Feedback was extremely positive.

Building on this success we made a second VR film in 2019. We increased the science content and length of this film from 2-4 minutes. Dr Lisa Whittaker worked with Sarah Galloway and Georgina Mason, PhD students funded by Tenovus, to create film showcasing their research. This film starts in the lab and then travels inside the body to see how T-cells work.

Both VR films have been extremely popular with a wide range of people at different events including in our shops, in schools and at science festivals. We use this technology to communicate science and as a conversation starter, younger viewers love the animated ‘into the body’ part and adults have found the explanation of immunotherapy treatment fascinating.

Sarah Galloway
Cardiff University, United Kingdom

Georgina Mason
Cardiff University, United Kingdom

579 Insight talk

Transforming cultures: What can science communicators take from gender equality schemes such as Athena SWAN?

Clare Wilkinson
Science Communication Unit, UWE Bristol, United Kingdom

The Athena SWAN Charter was established in 2005 to encourage and recognise commitment to advancing the careers of women in science, technology, engineering, maths and medicine (STEMM) employment in higher education and research in the UK. In May 2015 the charter was expanded to recognise work undertaken to address gender equality more broadly, and not just barriers to progression that affect women. The paper will discuss how culture change initiatives like Athena SWAN can seek to mobilise change amongst university departments and practices, as well as some of the potential difficulties of such opportunities. It will also outline the aspects of such schemes that might be relevant to the science communication community, and those which are not.

The presentation will include data from a 2019 survey carried out with academic staff, students, technical and professional staff at UWE Bristol. This survey completed by 74% (n=111) of department staff included responses to questions on departmental culture, support for career progression, and equality and inclusivity, as well as a range of other topics. An infographic will be provided to support explanation of key results. The insight paper will encourage participants to reflect on their own role in gender equality, as well as the theoretical and practical implications of such agendas. It will also provide advice on how to engage students and colleagues in culture change initiatives, which are seeking to address a range of intersectional issues.

829 Roundtable discussion

Re-envisaging the visual communication of science

Matthew Wood
University of Tsukuba, Japan

Diagrams, charts, illustrations, and photographs have long been at the heart of communicating science, and with visuals and graphics becoming easier to produce and disseminate in the digital age, we can only expect them to play an ever-increasing role in science communication. This is a welcome trend for those who acknowledge the communication potential of visual modes, but to what extent do we really understand the impacts of graphics, illustrations, diagrams, photographs, and video, or how they should be employed to best effect in our field? While there is a lot that is relevant and insightful to be learned from the study of visual modes in other disciplines, this ‘imported’ knowledge base is not always applicable for the specific needs and characteristics of science communication and often fails to address important concerns for science communicators. For example literature on the educational impact of diagrams that does not consider engagement value, or literature on persuasive visuals that disregards the need for accuracy or explanation. Furthermore, science visuals perform unique roles (e.g. ‘icons’ of science literacy) that can only be studied within a science communication context.

This session will offer diverse perspectives on the use of visual modes for communicating science to argue for a transformation in the way we perceive and understand visual communication within the specific context of science communication. Speakers will discuss the epistemic function (explanatory or persuasive) of visuals in different contexts; affective and attitudinal impacts of diagram design; the development of a visual rhetoric for science communication; the motivational and educational roles of science comics; and the significance of these topics for science communication practice.

Yin Chung Au
National Cheng Kung University, Taiwan

Wiebke Finkler
University of Otago, New Zealand

Bruno Pinto
University of Lisbon, Portugal

703 Individual paper

The Development and Change of Scientific Journals in China under the Media Integration

Dan Wu
China Research Institute for Science Popularization, China

Mass media is an important channel for science and technology communication. With the rapid development of new technology and the further strengthening of media integration, the means of communication are becoming more and more abundant, and the role of mass media in science and technology communication is more prominent.

In China, journals, as a traditional medium with a long history, are constantly integrating new means of communication to adapt to the development of the new media era. They are issued and disseminated by various media (such as social media, mobile terminals, etc.), so as to realize the boundary melting between different media and promote the value-added and efficiency of content resources. At the same time, new technologies, such as artificial intelligence, big data, visualization and so on, are also used to realize the intelligent publishing mode.

The main content of this paper is to analyze the changes in communication technology and communication methods of Chinese scientific journals and the new development status under the background of media integration.

This paper mainly includes four parts: the first part is to introduce the current situation of science and technology communication of Chinese journals; the second part focuses on the new means and methods of communication adopted by Chinese scientific journals under the situation of media convergence; the third part discusses the application of new technologies in science and technology communication of journals; the fourth part takes the Chinese Academy of Engineering, Chinese National Geography and Knowledge is Power as examples to analyze in detail the status of science and technology communication. The fifth part summarizes the existing problems and puts forward relevant development suggestions.

687 Insight talk

Science-edu-communication: Trends reveal in 20 years of science communication research

Leon Yufeng Wu
Chung Yuan Christian University, Taiwan

By investigating scholarly output in science communication from 1997 to 2018, this research sought evidence that science education has been increasingly focusing on communication methods to reach the public, while it has increasingly emphasized the learning effects in informal approaches for learners rather than formal school settings . Through an automatic scientometric method, namely, Content Analysis Toolkit for Academic Research (CATAR), this study analyzed 1300 articles published in two leading journals in the field of science communication, Science Communication and Public Understanding of Science. As a result, seven trends were revealed and categorized into three themes: Public engagement with science (PES); Media and science (MS); and Issues in science (IS). Furthermore, PES and MS scholarly output were found increased significantly. The findings confirmed the goal of this research. It was confirmed in this research that scholarly output of science communication has trended toward a sharing goal of science education: promoting public understanding of science via ways of public engagement of science and media representation of science. However, it then suggested a research area of bridging science education and science communication that is currently less explored. Given increased focus towards PES and MS, these fields are primed for further collaboration to more engage the public in science learning.

Nathan M. Truong
National Taiwan Normal University, Taiwan

Hsin-Yen Lu
National Taiwan Normal University, Taiwan

Yuen-Hsian Tseng
National Taiwan Normal University, Taiwan

Chun-Yen Chang
National Taiwan Normal University, Taiwan

609 Individual paper

Citizen Scientists in Chinese Knowledge-Sharing Networks: Reconstruction of Discourse Authority of Scientists

Zheng Yang
The University of Sheffield, United Kingdom

The label “Citizen Scientists” refers to citizens who initiatively take the societal responsibility originally belonging to scientists, such as producing scientific knowledge, communicating scientific knowledge, participating in scientific policy making. Previous attention to citizen scientists has mostly focused on the process of production of scientific knowledge based on citizen science projects. However, in the process of science communication, there is also a group of citizen scientists. This study investigates citizen scientists in the Chinese knowledge-sharing network Zhihu, the biggest Chinese online knowledge-sharing platform. The methods of discourse analysis and social network analysis are used in this study to analyze the behavioral and discourse characteristics of the citizen scientist group in such online knowledge-sharing network. Research findings show that more than 40% of the answers about Genetically Modified food on Zhihu with the most likes were provided by citizen scientists. And they have tried to challenge the absolute discourse authority of scientists via deconstructing this scientific topic from various perspectives, such as politics, economy, entertainment, daily experience and so on. Meanwhile, the answers provided by citizen scientists on Zhihu tend to use a series of discourse techniques to narrow the distance between themselves and the audience, which is different from the scientists’ answers which tend to establish a discourse boundary between scientists and the public as audience on Zhihu. Based on this, the discourse ecology of online science communication is no longer the one-way linear model that scientists as communicators, the public as audience, but a plural-communicator system.

Zheng Yang
The University of Sheffield,

1043 Individual paper

Signs of March for Science: Did They Tell the Right Story?

Shiyu Yang
University of Wisconsin-Madison, United States

The ideal of science being an impartial enterprise immune from political biases has been a key to consolidating public trust and support for science. Nonetheless, in reality, science is almost inevitably influenced by politics. A direct reaction to the Trump Administration, the March for Science (MFS) global movement has been heatedly debated, as some worry that its political slant could drive further away social segments that are already distrustful of science.

We conduct a novel visual analysis of the protest signs at two marches, the 2017 March for Science in Washington, D.C. and the one in Madison, Wisconsin, USA. We identify common themes in the visual and textual narratives, and empirically examine three broad research questions: 1) to what extent political and partisan messaging is involved in MFS; 2) whether and how the protesters branded their action differently from the MFS organizers; and 3) what types of messages transfer from the civil society to the broader public sphere through news media amplifications.

To answer these research questions, we developed a coding scheme to analyze photos of signs taken on the protest ground (RQ1). Our initial results suggest that most signs contained political themes. Mockery was most often seen when the target was Donald Trump/Republicans. A wide range of environmental issues were brought about, with Earth being a prevalent visual theme. We then examine whether images of signs from the march organizers' official social media pages contain the same level of political slant (RQ2). We also conduct a Google News search of 310 news items covering the two marches from January 22, 2017, the inception of MFS, to May 31, 2017, when news about MFS died out. We apply the same coding scheme to analyzing images from online news items, taking ideological leanings of different news outlets into consideration (RQ3).

Todd Newman
University of Wisconsin-Madison, United States

Dominique Brossard
University of Wisconsin-Madison, United States

Luye Bao
University of Wisconsin-Madison, United States

Julian Mueller-Herbst
University of Wisconsin-Madison, United States

762 Insight talk

The effect of gender equality on the masculine image of physics and math in Japan and in the UK

Hiromi Yokoyama
The University of Tokyo, Kavli IPMU, Japan, Japan

It is known worldwide that there are fewer women working in and studying physics and engineering than in biology and chemistry. A previous study (Cheryan et al. 2017) conducted in the US devised a model to explain the strong masculine-based image of physics and engineering compared with biology, chemistry, and mathematics using three assemblages: (1) the masculine culture of the fields of study, (2) insufficient early experience, and (3) gender gaps in self-efficacy. Each assemblage consists of several items to explain the gender discrepancy. Considering that Japan is a lower gender-equal country (114th on the Global Gender Gap index), we improved the model by adding one assemblage, (4) gender equality/attractive culture, to explain the masculine-based image of physics and mathematics in Japan.

In this study, we turned our attention to physics and mathematics. We conducted online questionnaires in Japan and in the UK to investigate several factors, including (1) to (4) related to the masculine-based image of physics and mathematics, and to identify any unique factors in Japan and the UK. The online questionnaires were designed based on this model.

We found that some items in the additional assemblage, (4) gender equality/attractive culture of physics or mathematics, were significantly related to the masculine-based image of physics or mathematics in each country: The first item was “attraction to the opposite sex,” which was significant both for physics and mathematics in the UK. In Japan, the item of “intellectual women” was significant only in mathematics. These results suggest that the added assemblage, (4) gender equality/attractive culture of physics or mathematics, partially contributed to the masculine image of physics and mathematics, both in the UK and in Japan.

Yuko Ikkatai
Kavli IPMU, The University of Tokyo, Japan

Kei Kano
Shiga University, Japan

Euan Mckay
The University of Tokyo, United Kingdom

Azusa Minamizaki
Nagoya University, Japan

Atsushi Inoue
Nippon Institute for Research Advancement, Japan

759 Visual presentation

Promoting the spirit of science through the history of science: Taking the "Shape of the Earth" exhibition of the Beijing Science Center as an example

Hujun Yuan
Hefei TanAo Automation CO., LTD, China

We organized and summarized the history of human understanding regarding the shape of the Earth and designed it into a popular science exhibition, with the aim of presenting the spirit of science to the audience through the exhibition, as opposed to merely introducing historical knowledge.

The spirit of empirical knowledge is an important representation of the spirit of science. According to an ancient Chinese book from the 1st century BC, if the shadows of an eight-foot-tall pole in two different places differ in length by one chi (Chinese inch), the North-South distance between the two places is a thousand li (Chinese mile). People remained deeply convinced of such a statement, until the 8th century, when the monk Yi Xing of the Tang dynasty conducted large-scale geodetic surveys to determine the correct length of one radian of the Earth's meridian. In the exhibition, we described this part of history for the audience through an interactive wall. The wall interface is divided into four parts, which are respectively, background introduction, four points of measurement, production of observation tools, and calculating the results after conducting the measurement. We will explain the concept and significance of "empirical knowledge" through this interactive process.

The "hypothesis" is an important concept in scientific research. During the 17th century, the British scientist Sir Isaac Newton and French scientist Giovanni Domenico Cassini respectively hypothesized that the Earth is an oblate spheroid and that the Earth is a prolate spheroid. To explain this concept, we set up virtual animated characters of Newton and Cassini. When the viewer approaches the corresponding area, a sensor will be activated, to present this famous battle of the "British Orange and French Lemon" to the audience by means of a projection, while also explaining the underlying concept of the hypothesis to the audience.

Yajun Qi
Beijing Science Center, China

Kun Li
Hefei TanAo Automation CO., LTD, China

708 Insight talk

Second star to the right: a cultural project connecting art, tourism, history and astronomy

Alessandra Zanazzi
INAF Osservatorio Astrofisico di Arcetri, Italy

We present a project by Italian National Institute for Astrophysics (INAF) and Bas Bleu Illustration, a new format for a valuable cultural experience, connecting Astronomy to Art and History and creating collaborations between different cultural and scientific Institutions on the territory. This project is being carried out in Florence, undoubtedly one of the most visited places in the world: here, since Medieval times, through Renaissance and later, many major monuments are impressively connected to Astronomy and Science was considered a most relevant part of the greatness and cultural identity of the city. Our project aims at connecting Art, History and Science through different media:

The astronomical guidebook of Florence: attractive, simple and not-specialistic describing the Astronomy content of many major monuments and leading the audience to search for Science into artistic masterpieces, historical monuments, churches, museums, places that tell us about illustrious scientists.

(E.g. the Brunelleschi Dome “containing” the tallest sundial in the world; the marble Zodiac in San Miniato Curch; the geographic representation of the known Earth at the time of Cosimo dei Medici in Palazzo Vecchio; Galileo’s house and footprints; etc.; A map and itineraries to explore autonomously those astronomical places; Events such as walking tours with the astronomer, family activities, students’ visits etc.; events carried out in collaboration with the relevant institutions (Churches, Museums, etc); Another guidebook, specifically addressing children and families; Virtual reality enhancements and App deepening (currently under study.

By illustrating the guidebook and the related activities, we will present how we promote the prominent role played by Astronomy and Science, exploring real connections between Science and Society. Raising citizens’ awareness and making them curious about those connections, is a big challenge in order to bring science beyond the borders of its traditional audiences and overcome the perceived dichotomy between the “two cultures”- the humanities and sciences.

Chiara Di Benedetto
Bas Bleu Illustration, Italy

541 Individual paper

Depicting science on Iranian popular science magazines; Semiotic analysis of Daneshmand magazines covers images from 1964 to 2019

Zarrin Zardar
Allameh Tabataba'i University, Iran

Images are one of the best channels to communicate science to the public and pop science magazines around the world try to attract their audiences by cover images which hold a general meaning of what they intend to convey. It also represents, how the journalists see the science itself and their target audiences. Considering the deficit and public engagement models as a theoretical approach, this paper set out to explain the transformation of visual science communication in Iranian pop science magazines.

Daneshmand as the most long-lasting pop science magazine in Iran (1964-now), have been chosen for this study. An exploratory research study carried out to determine crucial changes during magazine's lifespan. It was divided to 7 stages including establishment, revolution, confiscating and war, economic reform, political reform, economic crisis and internet era. Then 14 cover images which were representative of different life periods of magazine, were selected by non-random purposive sampling and studied by semiotic analysis.

Based on findings, critical changes can be seen in cover images during magazine's lifetime. The color and visual elements selection in cover pages have been done more accurately and purposeful than the past. The designers use color and visual elements intentionally to create scientific concepts. Thanks to information technologies scientific concepts which are set as a magazine's main priority as a cover image have become more global and designers are more reluctant to follow international trends in visual science communication.

From a broader perspective, the cover images moved from positivistic paradigm to interpretive one. In the other words, the informative images of scientists or scientific achievements replaced by more sophisticated and metaphorical designs which engage audiences in the construction of scientific knowledge and meaning.

Finally, findings were discussed based on social, technological and cultural changes which affected the way the magazine depicted science.

1115 Visual presentation

Online conversations of GM foods in China

Tangyao Zhang
The Australian National University, Australia

Background: as the most populous country in the world, China is facing a security issue that has lately escalated to an unprecedented level since the trade conflicts between China and America began in early 2018. To produce more food, genetically modified (GM) foods were developed as one of several potential solutions. According to peer-reviewed scientific research, GM foods, especially those approved by food safety agencies, are the substantial equivalent to conventional foods. However, there are strong disagreements with GM foods among the public in China, which not only prevents the governments from making science-informed policies but also negatively shapes the R&D in the biotechnology industry.

Methodology: previous science communication studies suggest that people prefer to use the internet as their information source and communication tool about GM foods. These studies provide an overall picture from time to time but have yet to investigate the details of these online conversations between non-experts. This research offers insight into online conversations, especially the comments posted on webpages. The qualitative method was employed, and a total of 2,851 comments and conversational logs were sampled from six platforms (WeChat Moments, Zhihu.com, Sina.cn, Bilibili Video, YouTube, Twitter). The research also included 16 semi-structured interviews for contrastive analysis.

Results: 1) Eighty-two percent of the anti-GM comments are based on rumours or false information. However, these comments gain more trust and attention than pro-GM comments. 2) Scientific jargon is frequently observed from anti-GM comments. 3) Wording and expressions in online conversations show more extreme than face-to-face conversations. Detailed results will be displayed on the conference poster.

838 Roundtable discussion

How to foster scientific culture in the public: the role of academic journals

Ji Zhao
National Academy of Innovation Strategy, CAST, China

Initially scientific culture came into being within the scientific community. It is a set of values, patterns, code of conduct and social norms established based upon scientific activities. With the advance of modern science and technology in the past few decades, scientific culture has penetrated every corner of the society and become a mainstream value. At the same time, the diversity of social culture has also impacted affectedon scientific culture and shaped its diverse features.

Nowadays, due to the widespread usage of the social media such as Twitter, Facebook and YouTube, the public is widely exposed to science misinformation and extensive reports about the misconduct of the scientific community and the inappropriate application of modern science and technology. On the one hand, these negative information reports triggers self-reflection and self-criticism in the scientific community. On the other hand, the public tends to form pessimistic opinion and lose trust in science and technology. How to foster scientific culture in the public is a challenge facing government and the scientific community.

Academic journal plays an important role in scholarly communication. It ensures the quality of published findings by the merit of the peer review and the expertise of the workforce. Driven by the development of technology and economy, academic journals itself themselves areis also subject to profound changes. The use of networks, the growth of data-intensive and data-driven science and globalization of research have enriched the publishing context and dissemination model of journals. Academic journal provides good opportunities to showcase the development level and the diversities of scientific culture worldwide. Meanwhile, it can also be a source and site of regeneration of innovation ideas in the research field.

Therefore, in the proposed roundtable discussion, we would like to focus on the role of academic journals to foster scientific culture in the public.

Emma Weitkamp
University of the West of England, United Kingdom

Hans Peter Peters
Research Center Jülich, Free University Berlin, Germany

Zhengfeng Li
Tsinghua University, China

906 Visual presentation

A study on the popular science mass media of China in comparative perspective

Ji Zhao
National Academy of Innovation Strategy, CAST, China

It is stressed in China that technology innovation and science popularization are like the two wings that drive innovative development. However, at this moment, the development of technology innovation and science popularization is still unbalanced in China. One of the main challenges is that the input in popular science is inadequate. Scientists, enterprises and mass media are not actively engaged in supporting science popularization.

In this paper, efforts are focused on the popular science mass media, to study the difference between China's and abroad representative popular science mass media. In China, the popular science websites Guokr.com and SciMall.com are investigated. These two are among the most popular websites within the lay public and the scientific community. And each has its Wechat official account, which pushes once or twice posts daily. Internationally, the MIT Technology Review is selected for comparison purpose. The selection criteria of the investigated objects are these mass medias have the similar target audience in term of generation, education background, interest range. Comparisons are performed in aspects of topic quality and coverage, report depth and hotspots, journalist workforce, reader's service and etc.

It is concluded that each representative popular science mass media has its unique characteristics. However, there is still room for the mass media in China to improve, such as focusing more on providing scientific perspective for the latest news to help people understand its long-term outcome and impact. Furthermore, it is suggested to establish the mechanism of converting scientific and technological achievements into popular science resources. Meanwhile, Work related to popular science should be included in the incentive system of scientific research personnel, and a certain proportion of national science and technology projects and talent awards should be reserved for popular science talents.

Xuan Liu
National Academy of Innovation Strategy, CAST, China

Fujun Ren
National Academy of Innovation Strategy, CAST, China

705 Visual presentation

Exploration of the Danish Consensus Conference On Genetic Therapy

Jixuan Zhou
Peking University, China

Consensus conference is a practical form of scientific communication. For a long time, the discussion of consensus conference mostly stays on the macro-study of its form and significance, lacking of detailed case study. Besides, there has been almost no content analysis of consensus conference. Denmark as the origin of the consensus conference, held five consensus conferences on gene topics from 1897 to 2002. Other countries also held consensus conferences on gene topics almost at the same time.

Therefore, this speech will combine the above issues with the theme of PCST Conference to take the Danish consensus conference on genetic therapy held in 1995 as case, and discuss the following aspects:

1. Background and overview of the Danish consensus conference on genetic therapy. Analyze the reason, process and main content of the conference.

2. Past: Problems of the Danish consensus conference on genetic therapy. Formally, the consensus conference did not achieve real consensus. The participation of conference is limited and the validity is low. In content, scientists and the public have different concerns. Under the influence of scientific communication and genetic essentialist, the public has the suspicion of exaggerating the harmfulness of genetic therapy unilaterally. So what are the consequences of the above problems?

3. Present: The situation of the consensus conference and genetic therapy in Denmark. The Danish Technical Committee was cancelled by the government in 2012 due to the low participation. Other countries have also stopped consensus conference on gene issues. Public attitudes toward genetic therapy did not change much. So what inspiration does this case told us?

4. Future: Put forward the improvement measures of the public understanding of science. We need to improve science communication, respect the multiple values of the "non-consensus",and try to develop the way of dialogue between scientists and the public to the direction of nationalization, systematization and legalization.

947 Individual paper

Ensuring trust in science - Why perceived motives and the motivation of researchers are important in science communication?

Ricarda Ziegler
Wissenschaft im Dialog, Germany

Trust in science and researchers has become an important topic lately. Science communication has risen to unusual heights on the agenda of the scientific system and science policy-making not least in the context of the COVID-19 pandemic with political measures to fight it often being science-based.

Since its establishment in 2014 and also in three survey waves conducted in 2020, the German representative survey on public science attitudes – the science barometer – has included different questions around the concept of trust in science.

One aspect which comes up regularly here, as well as in other surveys, is the role which researchers' motives, the orientation of science towards the public interest and the dependence of researchers on their funders play when it comes to (dis-)trusting science. In this talk, results from the science barometer will be presented focusing on perceived motives and benevolence of scientists as well as on stakeholders driving research agendas in the eyes of respondents. Apart from results of close-ended questions and agreement levels for relevant items, results from open-ended questions will be presented on what constitutes a good researcher and who are the funders of research according to the respondents' best knowledge. The results will be put into the context of trust in science and used to argue for transformative processes within science communication practice.

Thus far, a shift from only sharing results towards also communicating scientific methods and processes has been proclaimed as part of the solution for ensuring trust in science. However, it will be claimed that science communication should entail even more and that there should be a greater effort to communicate motivations of researchers for working in science.

937 Insight talk

Joining forces for more impact - Bridging the gap between science communication practice and research

Ricarda Ziegler
Wissenschaft im Dialog, Germany

"The shoemaker's son always goes barefoot" – while science communication at its core communicates evidence-based messages, evidence-based approaches are rarely applied when evaluating the success, effect and impact of science communication itself. Many science communication practitioners still work by their own heuristics – mostly “gut feeling” – and science communication researchers often shy away from making practical recommendations from their results. This can lead to misunderstandings, an inefficient use of resources or in the worst case a waste of (public) money.

In our understanding, agenda setting and strategy formulation for science communication on a policy-making level has to be based on an informed understanding of science-society relations. This should translate into projects and activities which are set up according to the best available knowledge. At the same time, science communication researchers need to consider practical limitations and realities if they want to make contributions relevant for science communication practice – not denying the importance of research on the fundamental mechanisms of the public or individuals dealing with science.

This talk will present the argument for more fruitful collaborations between science communication practice and research in order to improve the impact and relevance of both. But how do we achieve this? First results and experiences from the establishment of a national platform on impact and evaluation in Germany will be shared. Supported by the Federal Ministry of Education and Research, Germany’s national science communication organisation Science in Dialogue has recently started to work on bridging the gap between science communication practice and research by implementing such a platform.

874 Insight talk

10 years of math hands-on activities in Mexico

Paloma Zubieta
National Autonomous University of Mexico (UNAM), Mexico

The majority of societies have a misconception of what Mathematics really are and cannot understand what are they important for. That is probably why they developed emotions, attitudes and beliefs that are not favorable for their Mathematical thinking. The main question we are addressing here is how hands-on activities can contribute to modify misconceptions about Mathematics and, therefore, start —or not— a transformation on the way society perceives and understands Math and Science.

For almost a decade, we have been working on hands-on activities from a scicom perspective in two different academical institutions —the Centro de Investigación en Matemáticas (CIMAT) at Guanajuato and at the Instituto de Matemáticas of the Universidad Nacional Autónoma de México (IMUNAM) at Mexico City— with similar approaches and at a variety of urban and rural environments reaching over one million people. We think that in Mexico, as in other countries, this Math communication products ought to modify perceptions and are useful in many different ways to contribute to social transformation else than just surprising and entertaining, as they already do.

Our aim is to discuss and find the biggest challenges and best practices for Math hands-on activities and how they can be implemented in different scenarios —outside schools—, maximizing their impact on diverse publics, where every person could enjoy activities that involve new ways to relate them to Mathematics, developing their scientific culture for transforming societies and truly assimilating Math at their daily life, generating public understanding and engagement with science.

Mariana Carnalla
Centro de Investigación en Matemáticas (CIMAT-Guanajuato), Mexico

Paulina de Graaf
Centro de Investigación en Matemáticas (CIMAT-Guanajuato), Mexico