



Botanical Garden of the
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Urban Accident Analysis Systems

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Fase 2
Case Study

Prof. Mauri Chisvert, PHD



[Objectives]::

- To do a detailed analysis of the situation of the TA data collection and analysis police procedures in several Spanish municipalities.
- To carried out, for some municipalities, several actions of improvement of such systems in the general framework of the SAU project and/or of specific agreements with the different municipalities.
- Extract useful information aiming to: (1) obtain some preliminary general conclusions and (2) have a basis for the contents design of the survey study.



[municipalities]::

- Barcelona (Large municipality: 1.527.000 inhabitants)
- Valencia (Large municipality: 761.800 inhabitants)
- Murcia (Medium-sized municipality: 377.900 inhabitants)
- Elche (Medium-sized/small municipality: 207.163 inhabitants)
- Castellón (Medium-sized/small municipality: 163.088 inhabitants).



[methodological (1)]::

- Work approach varies according to the particular circumstances of each municipality and of the type of collaboration that is established...
 - ...from the mere *obtaining of detailed information on the situation* in the municipality...
 - ...to the implementation of works and *concrete interventions in some municipalities*.



[methodological (2)]::

- Several fundamental elements are raised as optimal:
 - Study of the accident data system: Definitions and rules, computer support, working procedures, types of questionnaires, type of data and output exploitation.
 - Analysis of the accident data quality and, in some cases, application and validation of procedures of data quality evaluation.
 - Meetings with experts and technicians of each municipality. Evaluation referring the proceedings, computer tools and analysis outputs now is use.



[methodological (3)]::

- The case study is organised in 4 sections:
 - The sections 2, 3 and 4 are focussed on three delimited urban areas (Barcelona, Valencia and Murcia). In the study of each urban area, a positive critical aspect which pretends gathering - in a summarized way - **the basic core of the “best practices”** in order to study it in depth by strengthening it and drawing conclusions and important generalizations.
 - On the contrary, the first section is focussed on the most important topics related to **deficiencies and problems**.



[First section: deficiencies and problems (1)]::

- For this section, the diagnoses of all the mentioned cities have been compiled and synthesized.
- The defective critical aspects are collected without mentioning in which municipalities the specific problems occurred, with the aim of protecting very important confidentiality aspects.
- As well, it has been possible to take into consideration information of many other municipalities in the framework of:
 - ARENA II project with the Spanish General Directorate of Traffic.
 - SIDAT project with the Servei Català de Trànsit (SCT),
 - Both projects having the main purpose of improving the accident data records in the competences of each administration.



[First section: deficiencies and problems (2)]::

- For this section, the diagnoses of all the mentioned cities have been compiled and synthesized.
 1. Collection of accident data is more **oriented to an administrative and legal resolution** of the accident, where what is critical is to determine the responsibilities, than to the study of accidents with the aim of carrying out research and statistical analysis.
 2. **The human and technical resources available to fill in the suitable documents** for an accident **are often insufficient**.
 3. To what precedes, it has to be added that **sometimes the work is done on outdated database systems**.
 4. The information on accidents at a national scale starts with the compulsory fulfilment of the information fields required in the official national statistical accident report. This normally ends up implying a **duplication of tasks** since this is a report that is added to the other documents and that repeats a lot of information. In some cases, **the amount of required information uses to be excessive**, especially in the low-serious accidents for which an investigation is barely done.



[First section: deficiencies and problems (3)]::

5. In most cases, the municipal police forces **do not have a direct access to the information they fill in the national accident report** for its statistical exploitation, On the other hand:
 - The results of **the data exploitation by the official organizations** use to be presented with a huge delay and, sometimes, with such a **level of aggregation** that it means that they lose a great part of its utility for the authors of its collection at local level.
 - This entails that the local administrations handle **their own record and data entry for their own use**, emphasizing in this way the duplication of tasks and a work overload previously reviewed.
6. In many cases, **the agent that attends the accident on site is not the same as the one that fills in the statistical accident report.**



[First section: deficiencies and problems (4)]::

7. The current official statistical accident report is in paper format, then **it does not set filters and automatic control and reporting systems.**
8. As for the **information contents**, the official accident report does not consider the appropriate features and the particular needs of information of the urban areas.
9. Current **impossibility of being able to link the police records with other databases** like the databases of hospital coaches, forensic surgeons, emergency services, insurance companies, occupational accidents...



[First section: deficiencies and problems (5)]::

10. Locally, some urban police forces **have created their own data collection and analysis systems** and their own work procedures. This has produced a great **heterogeneity** of information which complicates the creation of a common database having the entire national record of accidents under standard criterions.
11. Actions **in road safety separated from accident data**. It has been noticed that the actions in urban road safety, in many cases, do not start from the accident statistical data analysis, because of, among other things, the lacks in the records and in the exploitation of these ones.
12. As a consequence of what has been previously said there are the important current lacks in the accident records in urban areas, given that **a significant percentage of urban accidents are not collected, or if they are, with serious problems as for the exhaustivity and quality of the data...**



[Section 2. “Best practice” 1: Urban Area of Barcelona(1)]::

- This part has been focused on the collection, coding and computerizing **accident data system**.
 - The city of Barcelona is, for the time being, one of the Spanish cities that has the best integrated and developed accident collection system.
 - From the point of view of the “best practice”, firstly some “basic principles” have to be pointed out, principles in which the development of the system has been based on and that, to a great extent, are the basis for its good performance.
 - These principles are the ones that are listed hereafter:



[Section 2. “Best practice” 1: Urban Area of Barcelona(2)]::

- These principles are listed hereafter:
 - **Two main objectives:**
 - (1) Facilitate the work of the patrol that makes up the report, supplying tools that reduce the administrative load and allow a greater dedication to the attention of the citizen and the analysis of the causes of the accident.
 - (2) Manage the information and transform it into “knowledge”, in a way that the fast detection and solution of the safety problems could be allowed.
 - All the process, from the action of the police in site until the data entry in the statistical accident report is **done by the same police patrol**.
 - The entry of the **statistical data is not an added task**, but it is integrated in the police management procedure of the accident information.
 - **Each data is only entered once**. Any information duplication is eliminated.
 - All the document outputs generated by the system are **homogeneous**. Their **distribution** is **automatically** done.



[Section 2. “Best practice” 1: Urban Area of Barcelona(3)]::

- The entered information allows fulfilling the statistical information requirements requested by the Servei Català de Trànsit (main traffic authority in Catalonia). Moreover, such information has to be **useful for its use at the local level**.
- **Optimization of the data entry procedure:** Speed up to the maximum the procedure by using data obtained automatically, filters, calculated fields, etc.
- Data exploitation: the system **must be able to detect, automatically, the risk areas or locations** (accident concentration stretches or points), generating the consequent alerts that allow a more detailed investigation.
- **“Proactive immediacy”:** In relation with the previous point, it makes reference to the possibility of detecting possible conflictive stretches at the same time when the accident data is entered: if the system detects an accumulation of cases in the place where the new accident has happened, the system notifies it to the agent that is entering the data.



[Section 3. “Best practice” 2: Urban Area of Valencia(1)]::

- The specific topic, as a particular case of “best practice”, that is described in this section is the one of the development of **accident data analysis system procedures**
- The most important developments obtained are focussed on three aspects:
 - 1. The use of analysis procedures that allow the study of the cross incidence on variables, with independence of risk exposure data.
 - 2. Represent this information on *graphs* in order to facilitate its understanding.
 - 3. Accident rate monitoring by streets



[Section 3. "Best practice" 2: Urban Area of Valencia(2)]::

HORA DEL ACCIDENTE EN FUNCION DEL DIA DE LA SEMANA

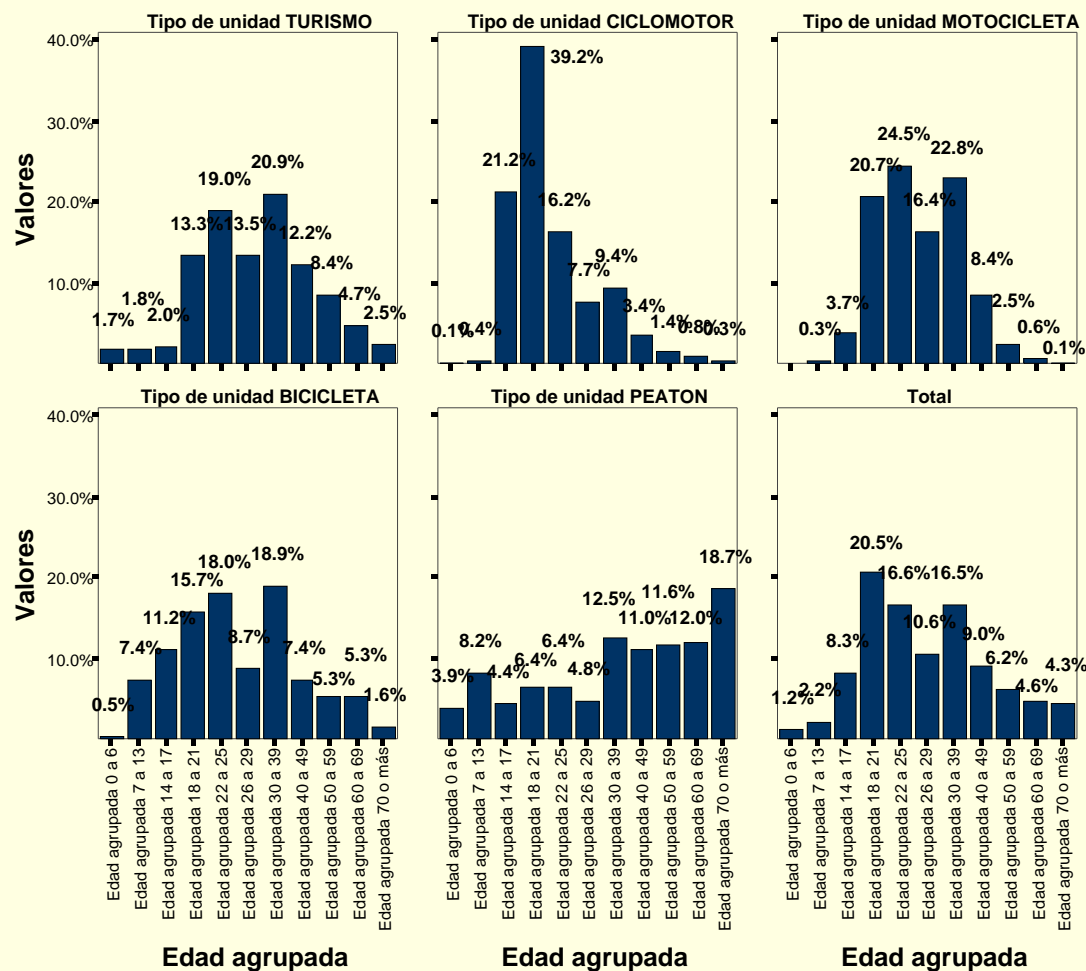
			Dia de la semana				Total
			LABORABLE	VIERNES	SABADO	DOMINGO	
Hora del accidente	23 a 7 horas	Recuento	1945	794	1538	1441	5718
		% de Hora del dia agrupada	34,0%	13,9%	26,9%	25,2%	100,0%
		% de Dia de la semana agrupado	12,2%	17,2%	34,4%	36,2%	19,7%
		Residuos corregidos	-35,6	-4,6	26,9	28,2	
	7 a 12 horas	Recuento	3372	833	556	566	5327
		% de Hora del dia agrupada	63,3%	15,6%	10,4%	10,6%	100,0%
		% de Dia de la semana agrupado	21,1%	18,0%	12,4%	14,2%	18,3%
		Residuos corregidos	13,4	-5	-11,1	-7,2	
	12 a 16 horas	Recuento	4141	1060	837	683	6721
		% de Hora del dia agrupada	61,6%	15,8%	12,5%	10,2%	100,0%
		% de Dia de la semana agrupado	25,9%	23,0%	18,7%	17,2%	23,1%
		Residuos corregidos	12,4	-3	-7,6	-9,6	
	16 a 19 horas	Recuento	2833	800	641	526	4800
		% de Hora del dia agrupada	59,0%	16,7%	13,4%	11,0%	100,0%
		% de Dia de la semana agrupado	17,7%	17,3%	14,3%	13,2%	16,5%
		Residuos corregidos	6,1	1,6	-4,3	-6,0	
	19 a 22 horas	Recuento	3699	1129	902	766	6496
		% de Hora del dia agrupada	56,9%	17,4%	13,9%	11,8%	100,0%
		% de Dia de la semana agrupado	23,1%	24,5%	20,2%	19,2%	22,4%
		Residuos corregidos	3,5	3,7	-3,8	-5,1	
Total			15990	4616	4474	3982	29062
			55,0%	15,9%	15,4%	13,7%	100,0%
			100,0%	100,0%	100,0%	100,0%	100,0%



[Section 3. "Best practice" 2: Urban Area of Valencia(3)]::

Tabla de contingencia A2-64: Víctimas por Edad agrupada * Tipo de uni

Estadísticos : % de Tipo de unidad

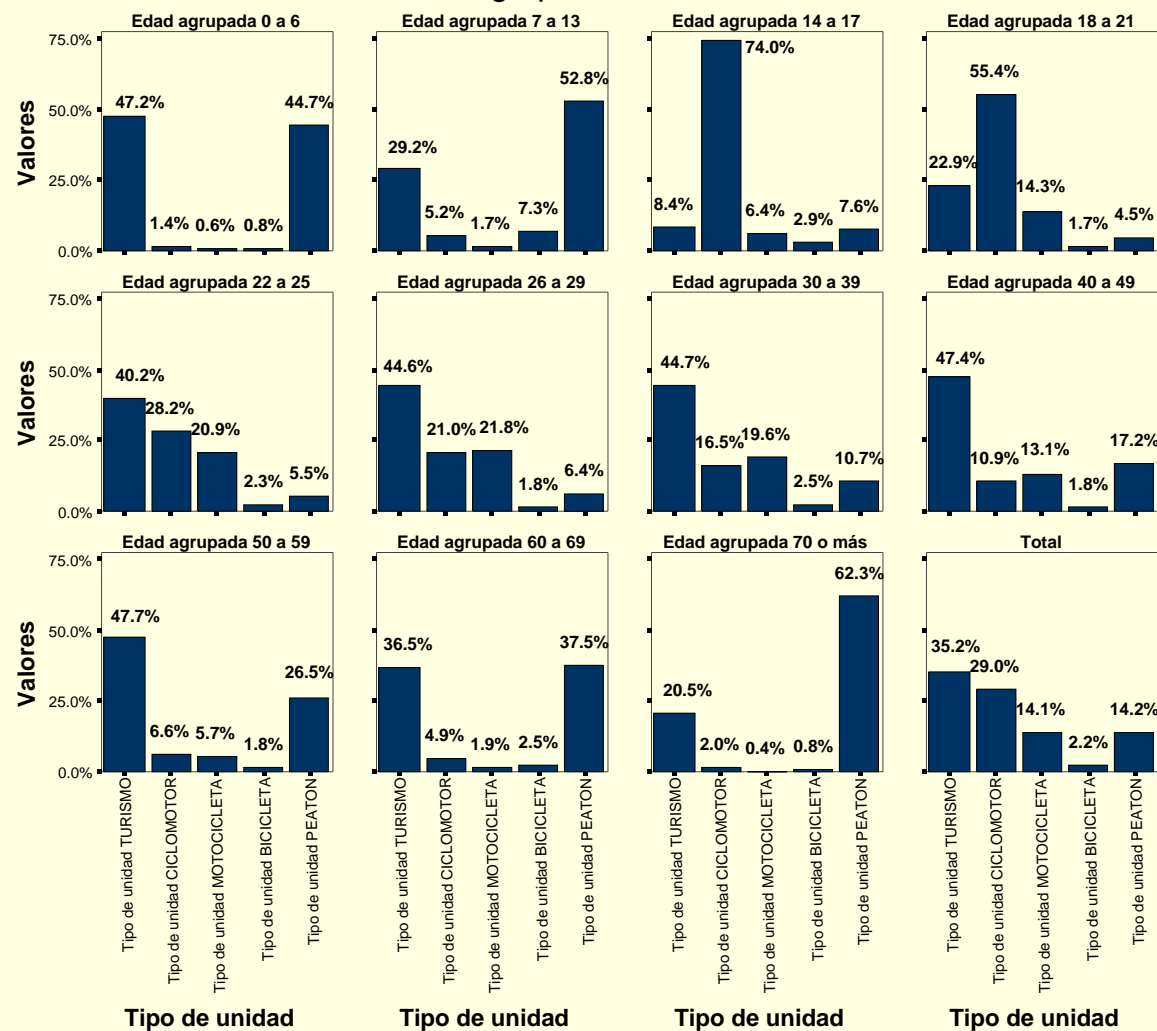




[Section 3. "Best practice" 2: Urban Area of Valencia(4)]::

Tabla de contingencia A2-64: Víctimas por Edad agrupada * Tipo de unidad

Estadísticos : % de Edad agrupada





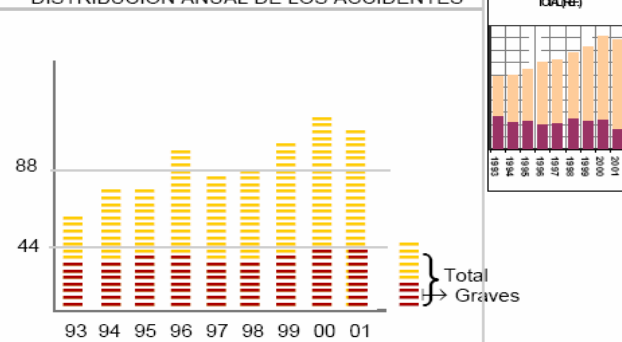
Código	Calle			Eje viario				
900				RESTO VIAS				
				Sentido	DOBLE	L(Km)	2,875	
	Accidentes Con VICTIMAS	Accidentes GRAVES	MUERTOS	IMD	Km X Vehículo	IP	IPG	
1993	59	30		45.777	48.036.905	122,8	62,5	<div>51.432 IMD</div> <div>163 IP</div> <div>61 IPG</div>
1994	73	30	1	46.845	49.157.518	148,5	61,0	
1995	72	32	1	48.767	51.175.199	140,7	62,5	
1996	96	35	2	50.185	52.807.368	181,8	66,3	
1997	80	31	1	52.255	54.835.014	145,9	56,5	
1998	85	29		53.464	56.104.158	151,5	51,7	
1999	101	35	2	55.656	58.403.965	172,9	59,9	
2000	115	37		54.469	57.315.177	200,6	64,6	
2001	110	37		55.472	58210880	189,0	63,6	
TOTAL	791	296	7	51.432	486.046.184	162,7	60,9	

IMD: Intensidad Media diaria IP: Índice de Peligrosidad (Accidentes con víctimas cada 108 Vehículos X Km)

IPG: Índice de Peligrosidad Grave (Accidentes con víctimas graves o mortales cada 108 Veh X Km)

Víctima mortal: Fallecido dentro de las 24 horas después del accidente Víctima Grave: Hospitalizada más de 24 horas

DISTRIBUCION ANUAL DE LOS ACCIDENTES



TIPO DE VEHICULO

	N	%	REF %
Turismo	909	56	53.2
Ciclomotor	241	15	17.9
Motocicleta	165	10	8.5
Bicicleta	58	4	1.6
Furgoneta	59	4	4.4
Autobus	26	2	1.9
Taxi	25	2	1.3
Camión	18	1	1.6
Peatón	130	8	9.4
OtrosVeh	2	0	.3
TotalVeh	1633		

TIPO DE ACCIDENTE

	N	%	REF %
Colisión	460	58	66.6
Obstáculo	3	0	.3
Salida Vía	73	9	7.8
Atropello	99	13	17.6
Vuelco		0	0.5
Otros	45	6	7.2

N: N° de accidentes/vehículos/víctimas
%: Porcentaje que, para esta calle, supone cada categoría. Las barras son %.

REF%: Porcentaje que, para el conjunto de la ciudad, supone cada categoría (Valor comparativo de referencia)

CRUCE / SECCION

	N	%	REF%
En Cruce	488	62	55.9
En Sección	303	38	44.1

EDAD DE LAS VICTIMAS

	N	%	REF%
De 0 a 6	6	1	0.7
De 7 a 13	17	2	1.3
De 14 a 17	100	9	5.4
De 18 a 21	244	23	16.0
De 22 a 25	223	21	16.2
De 26 a 29	109	10	11.6
De 30 a 39	174	16	12.2
De 40 a 49	91	8	8.2
De 50 a 59	61	6	4.7
De 60 a 69	31	3	3.2
Más de 70	20	2	
TotalVicti.	1076		

DIA DE LA SEMANA

	N	%	REF %
Lunes	118	15	13.8
Martes	95	12	14.1
Miercoles	94	12	14.7
Jueves	117	15	14.6
Viernes	119	15	16.2
Sabado	143	18	14.5
Domingo	105	13	12.1

HORA DEL ACCIDENTE

	N	%	REF%
De 23 a 7	230	29	17.4
De 7 a 12	149	19	19.5
De 12 a 16	176	22	24.2
De 16 a 19	105	13	16.5
De 19 a 23	131	17	22.3



[Section 4. “Best practice” 3: Urban Area of Murcia(1)]::

- The “best practices” specific part that appears in this section makes reference to two fundamental aspects:
 - 1) An intensive exploitation and use of the accident rate data as a tool to carry out a local **multilevel in-depth diagnostic study**, which will be the starting point to develop a large urban road safety local plan.
 - 2) **Integration of the accident rate data and studies into the mobility** ones in order to test its utility when used to offer recommendations on urban restructuring, especially taking into consideration the urban road safety aspects related with the mobility ones.



[Section 4. “Best practice” 3: Urban Area of Murcia(2)]::

- As for the structure by levels of analysis, **three levels**, from the most general or macro to the most specific or micro, have been differentiated.
 - 1- **Macro Level**. In this level:
 - A global study on the accident rate state in urban areas, taking as well into consideration the mobility data (2), is carried out.
 - It has been tried to identify and place in the space and time the main risk factors that condition the accident rate at the macro level.
 - 2 - **The intermediate level** of analysis and observational study are constituted of (1) an individualized detailed statistical accident analysis of each road and (2) a field observational study – on-site – of each one of the road.
 - 3- **Micro Level**. It implies the analysis, at the individual level, of all the available information on fatal accidents. It provides richer information on the causes of the accidents.



[Section 4. “Best practice” 3: Urban Area of Murcia(3)]::

- As to the work methodologies and the data sources, we may distinguish:

- **Statistical data analysis.**

This has been carried out by means of the use of cross or contingency tables, analysing the marginal distributions of the variables that cross as well as, particularly, the conditional distributions, using as statistical contrast “chi square” tests and a “cell by cell” study of the standardized residuals values.

- **Qualitative in-depth specific study of the fatal accident reports.**

- **Field observational study.** Field visits are carried out in the conflictive points and roads selected for the intermediate level.



[Section 4. “Best practice” 3: Urban Area of Murcia(4)]::

The most interesting thing of this approach is that it has allowed to **work from top to down**, allowing going in-depth as the concrete problems were appearing.

From this approach, actions at all the levels are derived from, from educational campaigns to specific groups to concrete actions on points or stretches of the road network.