



Intermediary report - January 2003

**OPTIMISATION OF ROAD ACCIDENTS STATISTICS  
(OPTIMA)  
CP-39**

BIVV - RUG

# SPSD II



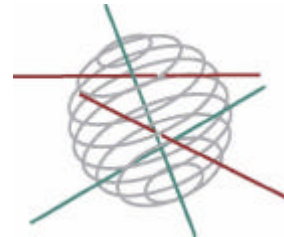
## PART 1

### SUSTAINABLE PRODUCTION AND CONSUMPTION PATTERNS



**This research project is realised within the framework of the Scientific support plan for a sustainable development policy (SPSD II)**

**Part I “Sustainable production and consumption patterns”**



The appendixes to this report are available at :  
<http://www.belspo.be> (FEDRA)

Published in 2003 by the  
Belgian Public Planning Service Science Policy  
Rue de la Science 8 - Wetenschapsstraat  
B-1000 Brussels  
Belgium  
Tel : 32/2/238.34.11 – Fax 32/2/230.59.12  
<http://www.belspo.be> (FEDRA)

Contact person :  
Mrs Aurore Delis ([deli@belspo.be](mailto:deli@belspo.be))  
Tel : 02/238.37.61

Neither the Belgian Federal Science Policy Office nor any person acting on behalf of the Belgian Federal Science Policy Office is responsible for the use which might be made of the following information.

The authors of each contribution are responsible for the content of their contribution and the translation.  
No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without indicating the reference.



# OPTIMISATION OF TRAFFIC ACCIDENT STATISTICS

## *Interim Report*

Initiator: DWTC

Authors:

Johan DE MOL (CDO)  
Sofie BOETS (BIVV)

Brussels, Gent, February 2003

---

Centrum voor Duurzame Ontwikkeling  
Poel 16, 9000 Gent  
tel: 09/264.82.09  
[johan.demol@rug.ac.be](mailto:johan.demol@rug.ac.be)  
<http://cdonet.rug.ac.be/>

Belgisch Instituut voor de Verkeersveiligheid  
Haachtsesteenweg 1405, 1130 Brussels  
tel: 02/244.15.11  
[sofie.boets@bivv.be](mailto:sofie.boets@bivv.be)  
<http://www.bivv.be/>

# TABLE OF CONTENTS

TABLE OF CONTENTS .....	1
1 INTRODUCTION.....	3
1.1 Context and summary .....	3
1.2 Objectives .....	4
1.3 Expected results .....	4
2 METHODOLOGY.....	4
3 INTERIM RESULTS, PRELIMINARY CONCLUSIONS AND PROPOSALS.....	5
3.1 The Netherlands .....	5
3.1.1 Problem formulation .....	5
3.1.2 Description of police records.....	8
3.1.3 Linked databases .....	9
3.2 Sweden.....	10
3.2.1 Description of the STRADA model.....	10
3.2.2 Description of police records.....	11
3.2.3 Description of hospital records .....	11
3.2.4 Output .....	12
3.2.5 Results of Swedish implementation .....	12
3.3 Great Britain .....	13
3.3.1 Introduction .....	13
3.3.2 Description of hospital records .....	13
3.3.3 Description of police records.....	13
3.3.4 Concurrence between hospital records and police records .....	14
3.3.5 Conclusion.....	15
3.4 United States of America.....	15
3.4.1 Description of hospital records .....	15
3.4.2 Description of police records.....	16
3.4.3 Concurrence between hospital records and police records .....	16
3.4.4 Implementation .....	16
3.4.5 Conclusion.....	17
4 PROSPECTS AND FUTURE PLANNING .....	17
5 ANNEXES .....	20
5.1 References.....	20
5.2 Publications.....	24
5.3 Illustrations .....	26
5.3.1 Structure of STRADA .....	26
5.3.2 Accident description .....	27
5.3.3 Surroundings and circumstances of the accident.....	28
5.3.4 Hospital information.....	29
5.3.5 Standard report.....	30
5.3.6 Output example .....	31
5.4 Questionnaire.....	32

# 1 INTRODUCTION

The OPTIMA project or the “Optimisation of traffic accident statistics”, initiated by the DWTC<sup>1</sup>, is part of a strategy to obtain the necessary means to establish a traffic safety policy. A policy on traffic safety should be a reliable and representative reflection of safety issues. This makes traffic accident data an essential element in making policy decisions on traffic safety. In this sense, the availability of reliable and representative statistical material is the basis upon which traffic safety policy must be founded.

The project objective is to obtain more complete and more representative traffic accident statistics by linking hospital records with existing police records and comparing the hospital data with available police information.

Part 1 of the project, the description of the existing situation, goes through a series of steps. The introductory text explores the problem of the current incompleteness of recorded data in Belgium. This is followed by an international investigation of recording methods in the Netherlands, Sweden, Great Britain and the USA. This section provides a more detailed description of hospital records and the concurrence between hospital and police records. In the a following report the current Belgian process for hospital records, as well as the procedure through which the hospital notifies the police will be set out. This part will end with a series of policy suggestions, based on the description of the weaknesses of the existing formalities for records.

Part 2 of the project outlines a demonstration record system for traffic casualties in hospitals. The aim is to introduce this demo into an emergency admission service and to extend it to a day clinic at a later stage. At the same time, the possibility of coupling hospital data with police data will be explored. Foreign experience with traffic casualty records will be put to use in this experiment. Alongside the demonstration, the possibility of recording traffic casualties through primary care services will also be examined.

Part 3 features policy proposals and validates the research results.

This inception report looks at the state of affairs in part 1 of the research project, and more specifically at the problem of the current under-recording of traffic casualties in Belgium and at recording methods in the Netherlands, Sweden, Great Britain and the USA.

## 1.1 Context and summary

The OPTIMA research started from the results and policy proposals of the DWTC’s research project “Objective and Subjective Lack of Traffic Safety”. The “objective lack of safety” component was carried out by the CDO<sup>2</sup> from 1997-1998. This research revealed the major limitations in the reliability of traffic statistics<sup>3</sup>.

Current statistical material is neither sufficiently complete nor sufficiently representative. As part of the existing procedures, there is an urgent need to automate recording procedures by the police and the public prosecutor. Automation of police records is particularly important: this record should be made at the place of the actual accident.

If no solution is found in the short term to automating in a way that includes all the basic information in the classic official report while avoiding all the incidental proceedings, the

---

<sup>1</sup> Federal Office for Scientific, Technical and Cultural Affairs

<sup>2</sup> CDO: Centrum voor Duurzaam Ontwikkeling (Centre for Sustainable Development)

<sup>3</sup> DE MOL, J., Impact van de verkeersonveiligheid en -onleefbaarheid, objectieve verkeersonveiligheid, eindrapport, Gent, CDO-RUG, 1999, 191 pages + annexes.

quality and the quantity of records will suffer even further. In 2002, the federal and local police launched a series of pilot projects on the matter. The aim is to have a 'one-off recording procedure' in place by 2004.

While police accident records will always be incomplete to some extent, this practice should be maintained and supplemented with traffic accident data from hospitals. To this end, it is necessary to organise the traffic casualty records in hospitals. For the time being, hospitals still keep the information in the individual doctor's files. Given that traffic injuries are a major area of expenditure within the social security system, the data collection approach seems only appropriate. At a later stage, the primary caregivers must also become involved: patient files can serve as a basis for this.

The literary overview shows how traffic accidents are recorded in the SUN countries (Sweden, UK, the Netherlands) and in the USA. There is a continual theme running throughout this literary overview: the possibility - or the effective application of - linking different sources of records or databases. There is an overwhelming call for coupling police data with hospital information. The only difference lies in the type of databases and the manner in which they are linked. There are efforts underway in all four countries to couple existing data with a view to obtaining more complete and therefore more representative traffic accident statistics.

Not all these countries are working towards this goal in the same, fixed, structural manner: some countries undertake coupling periodically (the Netherlands), limit the coupling to specific regions or have not yet introduced a system that is applicable everywhere (Great Britain). In the USA, there is more of a data warehouse structure, while Sweden has developed a specific system that automatically couples medical reports with police traffic accident data.

## **1.2 Objectives**

Using the results of studying the literature and exploring current record procedures, the objective is to set up a demonstration record system in the emergency services of the Gent University Hospital (Universitair Ziekenhuis Gent or UZG). This will be extended to day clinics and primary care at a later stage. Of course this will only be possible if electronic patient information management is available.

For this demonstration, it must be seen whether the Swedish experience with the STRADA system (Swedish Traffic Accident Data Acquisition), developed by Aerotech Telub, can be repeated.

Using the analysis of the existing record systems and the results of the demonstration, proposals will be formulated for use by the competent Ministers of Mobility & Transport, Social Security and Health Care. The ultimate goal is the national implementation of a permanent coupling system.

## **1.3 Expected results**

It is expected that the demonstration record system at UZG will reveal the problem of police under-recording of (the types of) traffic casualties. This approach should also make it possible to link accident data with clinical follow-up and medical/social costs.

# **2 METHODOLOGY**

We will start by exploring the existing procedure for creating hospital records of traffic casualties in the three SUN countries and in the USA. According to official traffic safety

statistics and indicators<sup>4</sup>, the SUN countries are the three countries with the highest records of traffic safety in Europe. We will also see whether the STRADA system can contribute to setting up an effective record system.

To keep the literary overview as clear as possible, a structured questionnaire<sup>5</sup> was drafted and sent to contact people in the four countries. As there was only a limited response to this questionnaire, information was collected mainly from each country's official website and from their links. Through these Internet sites, opportunities arose to ask key figures for more detailed information.

With a view to explaining the current situation in Belgium of patient records, a meeting<sup>6</sup> was organised with researchers and certain staff members, including the head of emergency services at UZG. After a general overview, more detailed information was given on the contents of and procedure for patient records. Upon closer examination, it emerged that there is no uniform patient record system in Belgium. In other words, every hospital uses its own record system. This must be taken into account when attempting to move towards a more general interpretation.

### 3 INTERIM RESULTS, PRELIMINARY CONCLUSIONS AND PROPOSALS

#### 3.1 The Netherlands

##### 3.1.1 Problem formulation

The first problem that emerged with data records was the fact that recording objectives do not always correspond with the objectives of scientific research or with the objectives for policy formation.

It is characteristic for the main record source, the police, to take their criminal and civil responsibility into account when recording the information. Indeed, this is set out as an objective of the Dutch Police Traffic Committee. This Committee stated: *"the primary objective of our records are to assist with the civil settlement of accidents and the secondary objective is to trace and follow up on offences, with the centralised recording of traffic accidents only a third objective"*<sup>7</sup>.

This was confirmed in a feasibility study assessing the effects of a promotion plan to reduce traffic accidents in the Netherlands by 25%<sup>8</sup>.

Police records are almost by definition incomplete. This is due to the combination of recording instructions and the manner of recording.

The guidelines set out by the police services determine what information the police record and what information the police choose not to record. The study by Harris (1989)<sup>9</sup> is an excellent illustration of this. In this study, Harris spent one year examining the results of an inquiry into the nature and range of the number of casualties in traffic accidents, and the completeness and representative value of the police records on these casualties.

---

<sup>4</sup> Source: IRTAD (International Road Traffic Accident Data) at [www.bast.de](http://www.bast.de)

<sup>5</sup> See annex.

<sup>6</sup> Meeting of the UZG emergency admission service on 10 July 2002.

<sup>7</sup> From the POLICE CENTRAL TRAFFIC COMMITTEE, *Het registreren van verkeersongevallen door de politie*, 1983, The Hague. Cited in NOORDZIJ, P.C., *Behoeftte aan gegevens over verkeersongevallen*, Leidschendam, 1995, SWOV P-95-71, on p. 11.

<sup>8</sup> HARRIS, S.M.A., *Veranderingen in de registratie van verkeersongevallen als gevolg van het stimuleringsplan "Actie -25 % Een haalbaarheidsstudie*, Leidschendam, 1990, SWOV R-90-18, p. 15.

<sup>9</sup> HARRIS, S.M.A., *Verkeersgewonden geteld en gemeten*, Leidschendam, 1989, SWOV R-89-13, 89 pages.

It emerged that of the 430,000 traffic casualties examined as part of the study, only 49,748 of them were actually recorded. While it must not be forgotten that the police only record those traffic accidents occurring on public roads in which at least one moving vehicle is involved, and that they do not record anything considered a “very light” injury<sup>10</sup>, at least 210,000 of these casualties should have been recorded.

This means that only around 1/9 of the study subjects and less than 1/4 of the 210,000 traffic casualties - who could have been recorded - actually show up in the police records. So it seems that police records are only the proverbial ‘tip of the iceberg’.

The method of recording determines to a great extent how correct, complete and representative the police record really is. The recording of accident data depends notably on the victim or vehicle reports. In certain cases, it also depends on how the police officer assesses the situation with his/her own eyes<sup>11</sup>.

The police record the data after a call, but this is no guarantee as not all accidents are recorded. As a result, large numbers of (especially light) injuries go unrecorded; the police rarely record casualties who do not require hospital treatment.

There can be any number of reasons for this: the injury was only felt as such after the police inquiry, the physical pain only emerged some time after the accident (for example, whiplash), it was not in the parties’ best interest to report the accident, the accident did not take place on a public road, it was only seen as a very slight injury, etc.

Harris’s study (1989) showed that police officers were present at 45% of accidents with casualties and that of these they recorded 52%; of the 115,000 traffic casualties the police witnessed, 55% did not require hospital treatment, for 45% polyclinic treatment was sufficient and 3% were admitted to hospital. So the Dutch police also failed to record a relatively high percentage (3%) of more serious casualties.

Schematically represented (vertically-aligned percentage), the situation is as follows in the Netherlands<sup>12</sup>:

Total traffic casualties	430,000	100%		
meeting record guidelines	210,000	49%	100%	
with police presence	95,000		45%	100%
having been recorded	49,748		24%	52%

This chart shows that based on the data supplied by the study, a great deal of information on casualties gets lost at every step of the way. The fact that half the information was lost can partially be ascribed to the fact that the police do not have to record a number of things (in accordance with the record guidelines). Of what they should have recorded – had they been made aware of it –, another half was lost because the police was not informed. And yet another half of the recorded data was lost either because it was not reported to the Traffic Accident Registration Department (VOR) or because it was erroneously reported (for example, accidents with casualties were reported as being exclusively material damage).

The fact that police records are incomplete was confirmed yet again by the above-mentioned studies<sup>13</sup>. While it has appeared in Dutch studies<sup>14</sup> that the records of the deceased (within thirty days) are nearly complete, this does not seem to be the case based on the few Belgian studies<sup>15</sup>.

<sup>10</sup> Ibidem, p. 17, the police do not register any casualties ‘if the injury is very slight, such as a scratch, the person is not considered wounded’.

<sup>11</sup> Having just patrolled the area.

<sup>12</sup> HARRIS, S.M.A., (1989), O.C., p. 42.

<sup>13</sup> Also see IRTAD, Underreporting of road traffic accidents recorded by the police, at the international level. Irtad report published by the Public Roads Administration, Norway, 1994

<sup>14</sup> HARRIS, S.M.A.,o.c., on p. 43. The accuracy of the records on the deceased can be checked again Statistic Netherlands’ figures on the causes of death.

<sup>15</sup> The study by Mens and Ruimte reports that the number of traffic casualties who die within thirty days is clearly underreported/under-recorded.



Based on police data, the number of casualties is incorrect and incomplete, as well as unrepresentative. Harris' study shows that police records are not representative because the completeness of the groups under examination varied greatly. So compared with the average recording level of 24%, the casualties who were not treated in hospital are extremely underrepresented at 12%. The most seriously injured<sup>16</sup>, to the contrary, are recorded relatively consistently (70%). Groups such as cyclists (11%), children on bicycles (5%) and cyclists who hit an object (2%) or in on-sided accidents (2%) are considerably underrepresented.

The data from this study correspond with the data from an older study by Maas (1982)<sup>17</sup>. Harris concluded that of all the accident and casualty characteristics, the seriousness of the injury and the involvement of a motor vehicle were the most determining in terms of police records.

The problem with accurate casualty records was also confirmed in a study by Hopkin et al. (1993)<sup>18</sup>. 90% of the traffic casualties recorded by the police as severely injured corresponded with the hospital figures, while only 69% corresponded in the case of lightly injured persons. It also emerged that the police had taken an equally large number of patients classified by the hospital as severely wounded, and recorded them as lightly injured. A tenth of the casualties reported as lightly injured by the police were classified as uninjured by the hospitals, while a small number of lightly injured casualties was not reported by the police at all. The latter was not confirmed in Dutch studies as the underreporting of lightly-injured casualties was estimated at 83% for first-aid treatment and at a similar percentage level for other injuries; of a total of 110,000 + 120,000 = 230,000 casualties, the police only reported 39,100 lightly-injured casualties. As this information is based not only on surveys, but also on the National Medical Records (LMR) and on the Home and Leisure Accident Registration System (PORS), it seems fair to assume that the Dutch figures may be closer to reality. Indeed, the differences may be explained by the inclusion or exclusion of records on specific accidents, such as one-sided or singular accidents.

In the study by Hopkin et al. the analysis was only relevant to accidents registered in hospitals, and it is not clear whether first aid treatment or day clinics were included.

The incorrect evaluation of severe and lightly injured casualties as revealed in the study by Hopkin et al. is confirmed in the study by Bull & Roberts (1993)<sup>19</sup>. This study compared 800 accidents with casualties (admitted to hospital) against police records. The proportion between the clinically classified severe casualties versus the severe casualties as recorded by the police was 86%. This figure was 48% in the Hopkin et al. study. The proportion between the clinically classified light casualties versus the light casualties as recorded by the police was 99% (98% in the Hopkin et al. study). In Sweden, Sande & Thorson (1975)<sup>20</sup> found the same figures as Hopkin et al.

While it is hard to differentiate between recording and reporting, it is important to note that after having been recorded by the police, the public prosecutor and/or the hospital, a great deal of information still ends up being incompletely reported or not reported at all. This is due to sloppiness and error, as well as to structural problems in the reporting system itself.

As the Dutch police records are completed with data from the National Medical Records (LMR) and the Home and Leisure Accident Registration System (PORS) - the Dutch data system seems to be one way of dealing with under-recording and underreporting<sup>21</sup>.

<sup>16</sup> Defined as those who were admitted to hospital.

<sup>17</sup> MAAS, M.W., De politieregistratie van verkeersgewonden in ziekenhuizen, Leidschendam, 1982, SWOV.

<sup>18</sup> Hopkin, J.M., MURRAY, P.A., PITCHER, M., GALASKO, C.S.B. *Police and Hospital Recording of non-fatal Road Accident Casualties: a study in Greater Manchester*, Berkshire, 1993, Transport Research Laboratory, Research Report 379, 32 pages.

<sup>19</sup> BULL, J.P., ROBERTS, B.J., *Road accident statistics - a comparison of police and hospital information*, 1973, *Accid. Anal. Rev.* 5: 45-53 cited in Hopkin en cons. (1993), o.c.

<sup>20</sup> SANDE, J., THORSON, J., *An evaluation of the official Swedish statistics on seriously injured in road traffic accidents*, 1975, *Scand. J Soc. Med.* 3: 5-11 cited in Hopkin en cons.

<sup>21</sup> See notably VAN KAMPEN, L.T.B., TROMP, J.P.M., BLOKPOEL, A., (1994), o.c.

Policy proposals to simplify the recording procedure on location could contribute to simplifying the reporting procedure and even to improving the level of reporting. One idea would be to record the accident on a portable computer<sup>22</sup>. This would prevent information from being lost or incompletely entered due to the lapse in time or other small human failings.

### 3.1.2 Description of police records

In the Netherlands, the record is based, inasmuch as possible, on a one-off on-location evaluation of the characteristics of the accident. For this, the traffic accident must be reported to the police emergency centre; in other words, those traffic accidents that are not reported to the police emergency centre are not taken into consideration<sup>23</sup>. The emergency centre also determines whether or not it is necessary to send the police, a decision that depends on how serious the centre considers the accident.

Depending on the seriousness of the accident (extent of damage and/or seriousness of the injury) and the seriousness of the traffic violation or the criminal act as the case may be, the police officer on the scene can choose among the following options:

- not to make a record;
- to only fill in a record form;
- to draw up a limited official report (similar to the report form, only with extra copies);
- to draw up an extensive official report (in addition to the record form and consisting of many pages).

The police forms are sent to the AVV/BG<sup>24</sup> and entered in a database. Only those police forms of a minimum quality level are entered; the others are kept in a separate file, but the information is not used for statistical analysis purposes. Data can only be entered up to the first of March following the year of the accident.

In the Netherlands, it has been determined that after around 60 days practically all accidents (99%) have been reported. 'Latecomers' are only taken into consideration in the case of fatal traffic accidents.

The Baseline Data Department (BG) of the Transport Research Centre (also known as the 'Transport Accident Registration Department') left something to be desired, which was why VIPORS was created in 1994. VIPORS stands for 'traffic accidents in PORS'<sup>25</sup>.

The VIPORS system records injury information alongside basic accident information. VIPORS is a traffic casualty record system based on the emergency departments of thirteen hospitals<sup>26</sup> in the Netherlands. VIPORS<sup>27</sup> features a special series of traffic safety variables in addition to the existing PORS variables.

In addition, the dataset of 'SIG Zorginformatie' National Medical Records (LMR) is also taken into consideration. The LMR dataset contains information on all people admitted to Dutch hospitals. Traffic casualties are selected from this set.

Based on the OIN injury survey (1992-1993), the number of traffic casualties was estimated at 250,000. The OIN methodology (Accidents in the Netherlands) consisted of a telephone survey in which around 60,000 people were asked whether they had been involved in an

---

<sup>22</sup> KOORNSTA, M.J., Current Statistical tools, systems and bodies concerned with safety and accident statistics, Leidschendam, 1995, SWOV D-95-24, on pages 11 and 12.

<sup>23</sup> See the earlier analysis of S. Harris (HARRIS, S.M.A., *Verkeersgewonden geteld en gemeten*, Leidschendam, 1989, SWOV R-89-13, 89 pages)

<sup>24</sup> Transport Research Centre (AVV), Baseline Data Department.

<sup>25</sup> PORS covers a sample set of fourteen hospitals. This number of hospitals represents approximately 10% of all Dutch hospitals with a 24-hour emergency department.

<sup>26</sup> These thirteen hospitals are – with one exception – the same as those used by PORS (14 hospitals).

<sup>27</sup> One-sided accidents with cyclists and moped drivers are entered as private accidents in the PORS system.

accident in a set period. On the basis of this survey, the classic police records - including one-sided cyclist and pedestrian accidents - were less than 20% complete<sup>28</sup>.

The following is a comparative overview of the various sources:

	Deceased	Admission to hospital	First-aid treatment	Other injuries
OIN <sup>29</sup>	1,300	18,700	110,000	120,000
LMR <sup>30</sup>		18,000		
VIPORS		< 18,700	110,000	
Police records	± 1,300	± 11,220	± 18,700	±20,400

### 3.1.3 Linked databases<sup>31</sup>

To gain an overview of the traffic casualty situation, the Netherlands has been coupling different sets of data for the past ten years. Probabilistic coupling is applied for coupling VOR<sup>32</sup> and LMR<sup>33</sup>. With **probabilistic coupling**, records are matched for those that share all the variables under consideration (the so-called coupling variables), however differences are also taken into consideration. Variables deemed as 'unknown' for one or more coupling variables are still taken on board.

There is no general distance defined for the space bridging the coupling variables (the coupling space) and there are matches not only for distance zero, but also for a distance greater than zero. The distance in the coupling space between the points that correspond with a record from the **VOR dataset** and one from the **LMR dataset** is like a measure of the (un)likelihood that the records concern the same traffic casualty. Distance zero is considered a perfect match: both records have the same value for the birth date of the casualty, the same gender, the same date and time of the accident; the two records list the same hospital. The more differences there are, the greater the distance becomes, lowering the likelihood of it being the same casualty.

The following is a more detailed explanation of these concepts:

#### 1. The coupling variables

The following variables are taken as part of the distance function: the epoch (date + time) of hospital admission and of the accident, date of birth, gender, hospital (number), the E-code<sup>34</sup> and the ERNSTSL variable<sup>35</sup>.

#### 2. The distance function

Each coupling variable has its distance coefficient. This records the distance as two records only if there are major differences between the variables. Some variables can differ to a certain extent. A large difference between the date of admission and the date of the accident (EPOCH) means it is practically impossible for it to be the same casualty. A formula is used to measure the differences.

<sup>28</sup> HARRIS, S.M.A., *Verkeersgewonden geteld en gemeten*, Leidschendam, 1989, SWOV R-89-13, 89 pages; VAN KAMPEN, L.T.B, BLOKPOEL, A, *Beoordeling van de compleetheid en representativiteit van VIPORS, over het jaar 1994*, Leidschendam, 1996, SWOV R-95-78, 60 pages.

<sup>29</sup> OIN: Accidents in the Netherlands (telephone injury survey)

<sup>30</sup> National Medical Records

<sup>31</sup> POLAK, *De aantallen in ziekenhuis opgenomen verkeersgewonden, 1985-1997*, R-2000-26, Leidschendam, 2001, SWOV, 67 pages.

<sup>32</sup> VOR stands for Traffic Accident Records; these records are put together by the AVV/BG (Transport Research Centre) on the basis of police data. They include data on traffic casualties, as well as on the actual accidents.

<sup>33</sup> LMR or National Medical Records contains data on all admissions to Dutch hospitals.

<sup>34</sup> The Ecode records the sort of accident. In addition to the Ecodes for (presumed) traffic casualties, the E-codes that list 'suicide' and 'cause unknown' are also selected.

<sup>35</sup> I.e. variables that relate to the seriousness of the injury; that is to say, the information that the patient has passed away (including the time elapsed since the accident) or that the patient was transported and/or admitted to hospital.

### 3. The matches

When matching, a record from one dataset is assigned to one record from another dataset such that the records with the least distance between them, the neighbouring records, end up assigned together. While selectivity plays no role in the matches, it does provide an indication of the quality of the match.

The VOR dataset includes a code that states whether a casualty was admitted to hospital and if so, to which hospital. It was nevertheless decided to include all traffic casualties in the coupling set. The main reason behind this was that coupling has revealed that only some 10% of the casualties that according to police records were transported to hospital but not admitted matched with the LMR dataset. A second reason to work with such an extensive set is that according to the AVV's coding guidelines, if a casualty is admitted later, this must be coded as 'not admitted'. A third reason is the fact that it is unlikely that the police could know if a casualty was admitted to hospital at a later date; in such a case, the record must be wrong.

For the linking, the software sets a maximum distance of 200 between the two records to be coupled. This is because when determining the distance function, a (theoretically arbitrary) distance of 100 was chosen as the limit beyond which the likelihood of a match would be less than 50%. A distance of 200 means a very unlikely match. Analyses have shown, however, that within groups with distances between 100 and 200, a not unlikely part of them matched. This could lead to a better calculation of the total number of casualties in both datasets.

For an epoch difference<sup>36</sup>, the quadratic function was chosen after evaluation. This runs from 0 to 100 for epoch differences from 0 to 4 positive days, from 0 to 1 negative day. One day was added to account for people who go home after an accident and are admitted to hospital only one day later, after a visit to the doctor, for example. -

## 3.2 Sweden

In Sweden, the record system is in a phase of complete transition. The STRADA record system is already in use in a large part of Sweden. This record system covers 40% of the population.

Rather than describing the old record system, we have chosen to describe the STRADA record model. This seems more logical given that the STRADA model could be applied in the demo model for this research.

### 3.2.1 Description of the STRADA model

STRADA stands for Swedish Traffic Accident Data Acquisition<sup>37</sup> and was developed by Aerotech Telub (SAAB group).

The objective is to come up with a reliable national system for recording accidents. In Sweden, four partners are involved: the Swedish National Road Administration, the cities, the police and the hospitals. They are seeking to find a reliable means for basing the monitoring of policy measures on traffic safety. Such monitoring of traffic safety measures was also needed to evaluate the aim of 'Vision Zero' (i.e. no deaths or serious casualties in traffic).

Both the police and the hospitals (clients) draw up reports on traffic accidents. Their entries differ considerably. The aim is to combine both reports in a database where the data can be analysed. Before being sent to the national database, the police and hospital information is checked for completeness and accuracy. It is then sent over Internet in a coded form. In the

---

<sup>36</sup> The epoch difference is the lapse of time between the recorded time of accident and the time at which the casualty was admitted to hospital.  
<sup>37</sup> Zie bijlage

database, the reports from the different clients (police/hospitals) are brought together and compared in order to come up with a joint report on the same accident.

Comparisons are made based on the following parameters: person(s) involved, time and location. After processing and removal of personal information, the database is sent to a database that is accessible to the public. The term 'publicly accessible database' must be put into a certain perspective, inasmuch as 'public access' means access for other clients.

### 3.2.2 Description of police records

Police records use three different basic types of information. Firstly, the precise location of the accident is determined with GPS (Global Positioning System), which provides very exact information. The second type of information is the description of the accident: this consists of both descriptions of the vehicles and persons involved in the accident and a drawing of the accident. The third type of information concerns the road: road type, speed limit, applicable traffic regulations (for example, traffic lights, priority rules, etc.), weather conditions, condition of the road surface (dry, icy, etc.), within or outside the city, visibility (day-night, street lights), construction, road works, etc.

These elements can always serve as a basis (along with personal information: identity of the persons involved in the accident, vehicle registration number, identity of the witnesses, etc.) for the traditional official report. These elements also correspond to some extent with the questions asked in the Belgian 'Analysis form for traffic accidents with fatalities or casualties' (VOF).

The data must be entered into a computer in the police vehicle: with this computer, the data can be processed directly and later sent directly on-line<sup>38</sup>. To avoid any discussion over the precise location of the accident - and also for more general police reasons - every police vehicle must be equipped with GPS.

A series of additional data is also entered to facilitate the tracing of the original data after transfer to the server. These data include the day number, the person in charge of the input and the time.

In the current Belgian situation, the Public Prosecutor plays an important role in the case of accidents involving fatalities or serious casualties. In the case of fatalities, the Public Prosecutor is informed of what is listed as an "unnatural" death. When (possibly) implementing the STRADA system, it must be seen whether this link to the Public Prosecutor must be maintained.

### 3.2.3 Description of hospital records

The hospital collects three different sorts of information:

- General information: name, address of casualty; vehicle, type of traffic accident.
- Description of the injury: this is based on the ICD-10 code (International Classification of Diseases), which supports the graphic representation. The ICD code is then transposed to an ISS index (Injury Severity Score). This makes it possible to compare injuries.
- The third sort of information involves a digital map to situate the place of the accident. This means the ambulance must be equipped with a GPS system.

---

<sup>38</sup> Indeed, this would make it possible to notify the Public Prosecutor immediately in the case of fatalities, serious casualties or incriminating circumstances.

It is also possible to include the costs of medical care, sick leave and the like. This makes it possible to develop the system such that it provides a better overview of the costs of traffic accidents.

For the future, the possibilities of extending the system to polyclinics and primary health care must be explored. However, this would be dependent on the introduction of an electronic patient management system that would make it possible to collect traffic accident casualty-specific information. The information can only be sent on if all the required or necessary data have been entered.

### 3.2.4 Output

An SQL database is used for the output, providing a flexible, easy means of analysis. The data can be requested using various parameters: geographic location (complete with zoom-in function), time, seriousness of the accident (injured, lightly injured, seriously injured, fatally injured), type of accident (who was involved or other elements of the accident), age, gender, etc.

The standard report displays all the accidents for the selected region. The accidents are represented by blocks of colours with the colour determining the seriousness of the accident. A (clickable) list of all accident reports is also available. All the other data can also be requested for each report. However, this is only the case if the data is available. It goes without saying that it is also possible to access all the details of the accident selectively - irrespective of personal information that is not included in the output in any case.

This database cannot be accessed by just anyone, and set procedures are used to keep accident data from becoming personalised. If this was not the case, personal data on the casualties could be retrieved on the basis of the date and place of the accident. And this would mean free access to awkward information.

This output can also reveal which accidents were recorded by the police and/or hospital. This makes it possible to pinpoint the reasons behind the lack of records and if necessary, to adapt the record procedure accordingly.

It is worth noting that police records score notably low for certain time periods and that rarely more than 50% of accidents are recorded compared with hospital records. It is also important to note that the two have very few records in common, leading to the conclusion that it is essential to combine both sets of records.

### 3.2.5 Results of Swedish implementation

The goal is to implement the STRADA system across the entire Swedish territory in 2003. At present time, 40% of the Swedish population is covered by this record system.

There are still a few missing elements. The Swedish police force is not yet fully equipped with GPS and a computer in each vehicle. As a result, a lot of the police record work still takes place in the office. The same goes for the GPS in ambulances. The most interesting part of the STRADA system is the double input of data - from the hospital and from the police -, which not only increases the coverage of accident records, but also considerably increases the quality of data.

### 3.3 Great Britain

#### 3.3.1 Introduction

At the order of the Road Safety Division of the Department for Transport, Local Government and the Regions (DTLR), the Transport Research Laboratory (TRL) has been carrying out a series of studies since the 1980s recording, comparing and/or coupling the medical information of traffic casualties and accident data from police services<sup>39</sup>.

Initially, the sample set of hospitals and/or emergency services was geographically and temporally limited. The latest studies have gone for a more regional analysis over a longer time span.

#### 3.3.2 Description of hospital records

Various hospital data sources were used in the TRL studies.

The most recent study by Broughton et al. (2001) combined the simple police classification system for injury seriousness with the more detailed clinical information from the UK Trauma Audit & Research Network<sup>40</sup> (TARN), an operational system of data collection and analysis covering over half the emergency services in all of Great Britain.

A selection of their medical data, notably the information on seriously injured traffic casualties, was made available to TRL from 1994 to 1996. Of the 13,809 traffic casualty statistics in the TARN databank, 8,368 matched with police data (61%).

In both the studies by H.F. Simpson (1996, 1997) evaluating police underreporting and under-recording of traffic accidents, the hospital information from a large sample set of hospitals (16 and 18) was combined for 1 and 3 years respectively via the 'DTI's Accident Surveillance System'<sup>41</sup> by the administration of emergency services. Hospital staff identified the traffic casualties<sup>42</sup> and collected as much of the following information as possible: accident circumstances, casualty details, clinical details, etc. All these data were entered into a computer and sent to the DTI's central databank. The DTL then determined which information to send on to the TRL.

The TRL studies were only provided with the information needed to improve the national police traffic accident databank. TRL was never given access to the full medical database. The official approval of the Privacy Committee was received for the method used to access hospital data and the conditions of its use.

#### 3.3.3 Description of police records

A police officer who has been informed of and comes to the scene of a traffic accident must fill in the national record form for traffic accidents, the STATS19, which is subsequently

---

<sup>39</sup> Nicholl, J.P., 1980; Stone, R.D., 1984; Hopkin et al., 1993; Simpson, H.F., 1996; Simpson, H.F., 1997; Keigan, M. et al., 1999; Broughton, J. et al., 2001.

<sup>40</sup> In 1975 the Washington Hospital Centre developed a statistically based clinical audit system for defining efficient medical care systems. A number of British emergency care doctors followed this example and in 1988 came up with the Major Trauma Outcome Study (MTOS), collecting and comparing data from various hospitals. TARN was founded in 1992 by the 'Royal College of Surgeons of England' and is based on this study. 'Trauma audit' is now an integral part of the activities of a hospital. By late 1997, TARN was already receiving data from 49% of the hospitals in England, Wales and Northern Ireland. In 2000, the databank contained data on over 120,000 patients (see the site of the TRAUMA Audit & Research NETWORK at <http://www.tarn.ac.uk>).

<sup>41</sup> The Accident Surveillance System is part of the Department of Trade and Industry's 'Safety Research Programme', which keeps up-to-date statistics on accidents from a representative group of hospitals.

<sup>42</sup> Definition of a traffic accident: any accident having taken place on a public road, including footpaths, in which 1 or more vehicles was/were involved.

entered into a computer. In addition to information on the circumstances of the accident, the form includes space for vehicle and casualty information.

The form includes three overall categories for evaluating the seriousness of the injury: fatal (dead within 30 days as a result of the accident), serious injuries (any injury that requires admission to hospital or one of the following injuries: fractures, internal injuries, serious cuts or gashes, serious bruising, cerebral contusion, serious overall state of shock requiring hospitalisation or injuries leading to death after 30 days or more) or lightly injured (for example, sprains, bruises, light cuts or slight state of shock that can be treated on location).

In the case of fatal traffic accidents, the STATS19 form is systematically accompanied by a post-mortem report by a pathologist.

### 3.3.4 Concurrence between hospital records and police records

The computerised linking procedure developed by the TRL in 1984 (Stone, 1984) has also been used in the more recent studies (such as Broughton, 2001; Simpson, 1996). This technique links information from both sets with a view to providing more extensive traffic casualty data. The statistical coupling algorithm recognises related records from both databases based on a number of key variables within adjustable control limits.

In most of the TRL studies, both databases were compared using common variables such as geographic location, date and time of the accident, age and gender of the casualty and type of road user.

In the most recent study (Broughton, 2001), starting on day 1 of the year, all STATS19 reports of the day and the TARN reports of day 1 and 2 were read in to the computer. Just like in other TRL studies (Stone, 1984; Simpson, 1996), casualties with the same key variables were coupled in both databases and various tolerance levels<sup>43</sup> were established to allow for slight differences between the coupling variables. Variables such as the age of the casualty or the date of the accident for instance – which are not always accurately recorded - can vary within pre-defined limits between police and hospital records.

In this study, the most matches were found within the first tolerance level, namely the perfect matches (71.6%). The most additional matches were found within the tolerance level in which the age of the casualty could vary by 1 year within STATS19 (14%). The remaining tolerance levels provided very few other matches (i.e. seriousness of the injury can be fatal in the police data; TARN fatal can be linked with STATS19's seriously injured; road user type may have any value in TARN; and if the casualty is brought to a hospital in a border region between provinces, the traffic casualties are also accounted for in the surrounding regions).

The coupling factor did not differ according to age and to gender. It was only within the different types of road users that it was found that the most matches involved car drivers and pedestrians and that the fewest matches were found with cyclists.

After the coupling procedure, Broughton et al. could complete each uniquely coupled STATS19 record with a number of variables from patient data: for example, the length of hospital stay, the Abbreviated Injury Scale (AIS) codes (18), the General MAIS (Maximum AIS) and the MAIS code for the most serious injuries on each region of the body, the Injury Severity Score (ISS-90), the extent to which the injury was life threatening, the Probability of Survival (PS), etc.

The remainder from day 1 was brought into the new day 2, and in this way the procedure was repeated for every day of the year.

---

<sup>43</sup> The tolerance level is the maximum difference between the values of the police and the hospital data that can be accepted as a match. For example: a tolerance value of 2 for the 'age' variable means that links in which the age differs by up to 2 years between the two databases would be accepted; a tolerance level of 0 means that as regards age, only exact matches would be accepted.



### 3.3.5 Conclusion

Despite the fact that current research projects have not yet led to a permanent national connection between hospital and police databases, they have nevertheless demonstrated the need to improve existing traffic accident statistics.

In addition to correlating the parameters of the injury (type, level of seriousness, etc.) and the related financial costs with the parameters of the accident, the TRL studies managed to explore the methodological aspects of the recording and reporting process. It emerged that police officers systematically underestimate the seriousness of the injuries in their reports and that only half of the casualties who appeared in the medical databases could be found in the accident statistics.

Through the DTLR, a multi-annual plan for traffic research was set underway (the so-called ROAME statement<sup>44</sup>). It reads as follows:

*“...Specific project objectives... are... to produce a report on the viability of linking hospital trauma data with STATS19 road accident data, and if viable, to conduct a trial link in order to inform the decision on the desirability of the creation of a permanent linked database, by June 2002...”*

The study by Broughton et al. (2001) provided the desired “trial link”. However, on inquiry to the author and those in charge at the DTLR, it appeared that it has not yet been decided to create a permanent system that could reliably link medical data (hospital and/or emergency services) with official accident reports.

The second phase of this study is now underway, using data from 1994 to 1999, and if possible including 2000. The report should be complete sometime in spring 2003.

## 3.4 United States of America

### 3.4.1 Description of hospital records

In the USA, medical information is recorded in various ways and by various bodies<sup>45</sup>, including the EMS (Emergency Medical Service), emergency unit services, hospitals and rehabilitation & long-term care services. Not every service records all the information systematically.

The responsibility for data collection lies with the individual States and not with an overarching federal organisation. The only type of information to be subject to systematic computerised collection by practically all the States is hospital information. The contents of the hospital database are standardised (including patient information, hospital, treatment, procedures, diagnoses (ICD-10) and medical expenses). The cause of the injury is also mentioned (for example, a traffic accident).

In addition, information from death certificates per state are collected and computer processed in a nationally standardised manner. Through the Fatal Accident Reporting System (FARS), the National Highway Traffic Safety Administration (NHTSA) has been collecting data since 1975 from the police and emergency services on all traffic casualties who die within 30 days following an accident on public roads. Every State sends this information systematically to the NHTSA and a national FARS report is published annually. A series of information is used to complete the FARS documents, notably the police accident report, the vehicle registration and driver's licence, vital statistics and death certificates, autopsy reports, hospital medical files and the emergency service reports.

<sup>44</sup> ROAME statement: <http://www.roads.detr.gov.uk/roadsafety/roame/index.htm>.

<sup>45</sup> NHTSA, Technical Report: *The Crash Outcome Data Evaluation System (CODES)*. DOT HS 808 338, January 1996. US Department of Transportation. (NHTSA site).

### 3.4.2 Description of police records

Police officers who come to the scene of an accident on a public road have to fill in an accident form (PAR: Police accident report) including information on the accident, the vehicles and the persons involved. Traffic legislation varies from State to State, and so does the content of these PARs. The information collected includes the type of accident, the contributing factors, the road type, identifying characteristics and behaviour of the driver, the identifying characteristics of the wounded occupants, the respect of safety regulations, etc. There are 5 categories for determining the seriousness of the injury: dead, serious or debilitating injury, non-debilitating injury, potentially debilitating injury and unharmed.

### 3.4.3 Concurrence between hospital records and police records

CODES stands for "Crash Outcome Data Evaluation System". It is an initiative of the NHTSA<sup>46</sup> that has already been implemented in 27 subsidised States. The system couples data from traffic accidents with motorised vehicles recorded by the police with medical data from ambulance and emergency services and from hospitals.

Under CODES, information on the vehicle, the accident and the persons involved is coupled with the specific medical and financial consequences. In each case, the data source deals with the entire population of the State concerned.

Given that unique personal characteristics are generally either not entered in a harmonised way on the computer or are simply unavailable, individuals must be identified through a combination of indirect characteristics.<sup>47</sup>

The actual linking is probabilistic<sup>48</sup>. Such a coupling technique is ideal for coupling databases that do not contain perfect identifying data. Traffic accident data are generally collected under far from optimal circumstances, which can lead to errors.

In the initial phase, blocks of 10 to 20 records are defined based on so-called "blocking" variables (for example social security number, date of birth). A "blocking" variable is generally an indirect identification datum with complete and accurate data within each record. Within each block, a coupling score is attributed to each combination of records based on a number of "linking" variables, which are not necessarily identical. Each of these variables contributes a weight that reflects its discriminatory power as determined by earlier matches. The coupling process attributes a coupling value to each match of 2 attributes. These values are totalled, leading to an overall coupling value per pair of records.

When the indirect characteristic variables are not sufficiently discriminatory, they are coupled with additional data (for example, vehicle registration, driver's licence) to increase their identifying power.

Coupling with hospital data is done in all the States concerned.

### 3.4.4 Implementation

The NHTSA hands the funds over to one organisation per State (such as emergency medical services office, universities, etc.) that bears the responsibility of arranging co-operation between data suppliers and users.

As part of the CODES project, an administrative structure was set up in early 1991. This structure encourages cooperation between participating partners (data suppliers and data

<sup>46</sup> Site of the National Center for Statistics & Analysis (NCSA): <http://www.ncsa.uiuc.edu/>

<sup>47</sup> CODES: <http://www-nrd.nhtsa.dot.gov/departments/nrd-30/ncsa/TextVer/CODES.html>

<sup>48</sup> NHTSA, Technical Report: *The Crash Outcome Data Evaluation System (CODES)*. DOT HS 808 338, January 1996. US Department of Transportation. (Site van NHSTA); Bigelow, W., Karlson, T. & Beutel, P., 1999. *Using probabilistic linkage to merge multiple data sources for monitoring population health*. Center for Health Systems Research & Analysis, University of Wisconsin – Madison, June 1999.

It uses AUTOMATCH software.

collectors) and, on the basis of protocols and consultation, exercises authority over the quality of the process. Systematic attention is paid to a number of quality aspects, including project management, communication, data reliability, privacy protection, validity, comparability between States and uniformity of coupling<sup>49</sup>.

The police and medical databases can be further coupled with databanks of non-accident-related information such as driver's licence registers, criminal records, insurance claims (health and vehicle), road information (such as GIS) and vehicle registration.

### 3.4.5 Conclusion

There still is no national system in the USA that systematically links police traffic accident data with hospital information. Both forms of recording are the responsibility of the State in question. However, there are already 27 American States that have agreed to implement the NHSTA's initiative of the CODES system, linking various sorts of medical databases with police traffic accident data. During the planning period, the States receive subsidies to make at least 2 years of data collection possible. The results of the linkage help to support the States' traffic safety policies. The next step would be to expand the system to a federal level.

Given the wide variety of types of data sources to be drawn from, such an approach seems likely to lead to the creation of a real data warehouse.

## 4 PROSPECTS AND FUTURE PLANNING

The literary overview provides an idea of the records of traffic accidents in the SUN countries and in the USA.

When evaluating the systems in place with regard to possible implementation in Belgium, the primary concern should be the independence of the coupling system in terms of building the database.

The Netherlands boasts a number of specific datasets that do not exist in Belgium, including the PORS<sup>50</sup> or Home and Leisure Accident Registration System. This system is the basis for VIPORS. And VIPORS basically consists of tracing traffic casualties back from the PORS dataset. It is comparable with the National Medical Records (LMR).

Neither the VIPORS nor the LMR datasets are systematically available in Belgium. This means that the couplings that are carried out periodically (not annually) in the Netherlands cannot be used in Belgium. There is no basis, i.e. analogous databases for this. It can thus be said that the Netherlands is also in need of a structural construction for coupling datasets. Herein lies the interest of the Swedish STRADA model.

In Great Britain, they have been trying for years to compare and link medical information on traffic casualties (hospital information) with police accident data. A lot of studies have been carried out on the matter since the eighties. The initial studies had geographically and temporally limited sample sets of hospitals and/or emergency services, but the studies are now increasingly being extended to a regional level over a longer period.

The ultimate goal is to achieve a permanent national link between hospital and police datasets. This is not yet the case, but it has shown the need to improve existing traffic accident statistics through this method.

---

<sup>49</sup> NHTSA, 2000. *Revised Catalogue of Types of CODES Applications Implemented Using Linked State Data* (06/2000). (NHTSA site).

<sup>50</sup> PORS covers a sample set of fourteen hospitals. This number of hospitals represents approximately 10% of all Dutch hospitals with a 24-hour emergency department.

The quality of traffic accident figures has also been improved in the USA through the coupling of medical information with traffic accident forms. This CODES system is already in use in 27 States: the goal is to generalise the system across the USA. This system boasts the advantage of creating a kind of data warehouse structure in which additional datasets can be coupled.

The Swedish STRADA record system combines police and hospital information in one database, from which the information is analysed. The advantage of this system is that the hospital can add to the data within the system. And the police can work within the specific police module. It hence seems that transposing STRADA to the Belgian situation is necessary, as well as manageable. Various countries, including the Netherlands, Denmark, Germany and other Scandinavian countries, have expressed an interest in the STRADA model.

The subsequent phase in this research is planned to be the implementation of the STRADA-system in the UZG and in the police service of Gent in the form of a demonstration record project.

Within the STRADA system, the hospital and the police have to submit their information separately. This demands extra means (staff), as existing data collections from the police and the hospital cannot be combined just like that.

This must be considered as an additional, yet extremely necessary task for the duration of the testing of a coupling system. In the case of the police, this is done by entering data collected from official reports into the statistical form. The aim must be to replace this labour-intensive work by automatically extracting the necessary data from the police force's traditional datasets.

This is one way to meet the police's request to replace such work - which in principle cannot be considered as a core task of the police - with the extraction of data needed for the statistical construction of a traffic safety policy.

A future report will describe the current Belgian hospital record system, as well as the hospital-police notification system. A running inquiry will be made into the records systems in some three Belgian hospitals. The results will be used to propose ideas on how to compose hospital data in terms of traffic accidents. These results should reveal to what extent existing record systems must be adapted or can serve as a basis for automatic data extraction. The aim is to work only with the data from emergency services in the initial phase, then later to extend this to include day clinics. At an even later date, if electronic patient management is in place, this will be extended even further to include primary care services.

As the demonstration underway will be limited to only one hospital, a pragmatic approach will be taken when implementing a system that couples police data and hospital information. This demonstration should make it possible not only to determine the strengths and weaknesses of the system, but also to learn important lessons before implementing the system across all of Belgium.

It is clear that data coupling is only complete if all the police data in one police region is combined with all the hospital data from the same region. However, this is not the case in this demonstration, as the police data is coupled with only one hospital. This means that the data from this one hospital forms the basis for all comparisons. As a result, for the hospital, none of the data on the traffic accidents outside the police zone can be used for comparison purposes. The data on traffic casualties occurring in the same police zone but taken to another hospital cannot be used for comparison either.

Without transposing foreign figures with regard to the under-registration of traffic casualties to the Belgian situation, the same trend seems to be confirmed by the little existing Belgian

research, which has investigated either a set target group<sup>51</sup>, a set accident category<sup>52</sup> or a set age category<sup>53</sup>: police records in Belgium are too limited to serve as a basis for traffic safety policy.

The current Belgian record structure is far too open to error, both in the case of fatality records and of casualty records.

The STRADA system in its current form is not able to portray all the accident data with fatalities or casualties. By further extending the system to polyclinics and primary care services in a later phase, we can improve the number of records even more. To this end, a few boundary conditions (including electronic patient management) however need to be met.

Based on this albeit limited initial analysis, it seems clear that STRADA has much to offer in terms of coming up with a new Belgian record system. Adapting STRADA to the Belgian situation will take some time. Adjustments will have to be made for the legal situation (mandatory police record, notification to the Public Prosecutor, data privacy protection) and the record "culture" (some still fail to appreciate the importance of such records). There is also the fact that the analysis is not always targeted towards the various potential clients. And the lack of an authoritative body in charge of quality control and scientific analysis of the data is a major problem to be solved.

In the quest at European level for a record system that provides data that is not only reliable, but also comparable, STRADA can serve as a basis for standardisation. Implementing this system could help in setting up a set of reliable and internationally comparable statistical data.

If the demonstration project has the desired results, consideration can be given to extending the project to all the hospitals in a given region. This way, we can proceed to the gradual implementation of the system across Belgium.

---

<sup>51</sup> DE SOMER, A., CLAEYS, D., THIBO, P., CLAEYS, R., RONSE, E., VANDEVEYVER, D., BUYLAERT, W., *Registratie van fietsongevallen in spoedgevallendiensten van een stedelijke regio*, Tijdschrift voor Geneeskunde, 49, nr 22, 1993, pp. 1559-1563

<sup>52</sup> MENS EN RUIJTE, *Diepte onderzoek dodelijke verkeersongevallen in België*, mei 1997, Studie in opdracht van het Belgisch Instituut voor de Verkeersveiligheid, Eindrapport, 216 pages.

<sup>53</sup> DE MOL, J., *Impact van de verkeersonveiligheid en -onleefbaarheid, objectieve verkeersonveiligheid, eindrapport*, Gent, CDO-RUG, 1999, 191 pages + annexes.

## 5 ANNEXES

### 5.1 References

- THE ASSOCIATION FOR THE ADVANCEMENT OF AUTOMOTIVE MEDICINE, *The Abbreviated Injury Scale 1990 Revision*, Des Plaines (VSA), 1990, 13 blz.
- AARTS, J.H., *Description of a SWOV pilot study on integral registration in hospitals of road traffic accidents. Paper presented at the OECD International Symposium on countermeasures to driver behaviour under the influence of alcohol and other drugs*, London, 22-23 September 1971, SWOV R-71-5, 4 p.
- AARTS, J.H., *Medische verbeteringen. Een literatuurstudie over de consequenties van de medische wetenschap en verbeterde hulpverlening op de aantallen geregistreerde verkeersdoden*, Leidschendam, 1989, SWOV R-89-39, 47 blz.
- ADAMS, J., *The severity Iceberg in Road Accidents in Great Britain*, 1993
- AUSTIN, K.P., *The development of a comprehensive database for accident analysis*, (1992), Institute for Transport Studies, Working Paper 378, Leeds, December 1992, 17 p.
- AUSTIN, K.P., *A linked and hospital road accident Database for Humberside*, Institute for Transport Studies, Working Paper 369, Leeds, July 1992, 18 p.
- AUSTIN, K., 1995. *The identification of mistakes in road accident records: part 2, casualty variables*. Accident Analysis & Prevention. Volume 27, Nr. 2, April 1995, p.277-282.
- BAKER, S.P., O'NEIL, B., HADDON, W., et al., *The Injury Severity Score: A method for describing patients with multiple injuries and evaluating emergency car*, in J. Trauma 27: 187-196, 1974.
- BENGT; Sjöö, CLAES, Johansson, *STRADA: nationellt informationssystem om skador och olyckor inom vägtransportsystemet: årsrapport 1999* (Sweden; Accident; Statistics; Administration; Injury; Fatality; Data bank; Data processing; Data acquisition; State of the art report), statusrapport 2001-06, Vägverket. Publikation 2001:39, Borlänge, 2000, sid: 27, ISBN/ISSN: 1401-9612
- BENGT; Sjöö, CLAES, Johansson, *STRADA: nationellt informationssystem om skador och olyckor inom vägtransportsystemet: årsrapport 2000* (Sweden; Accident; Statistics; Administration; Injury; Fatality; Data bank; Data processing; Data acquisition; State of the art report), statusrapport 2001-06, Vägverket. Publikation 2001:93, Borlänge, 2001, sid: 19, ISBN/ISSN: 1401-9612
- BIVV, *Het gebruik van ongevalgegevens in het gemeentelijk verkeersveiligheidsbeleid*, Brussel, juni 1994
- BLOKPOEL, A., *Registratie van verkeersgewonden in het privé-ongevallen registratiesysteem (PORS); resultaten van een proef*, Leidschendam, 1990, R-90-53, 64 blz.
- BLOKPOEL, A., NOORDZIJ, P.C., OPPE, S., FLURY, F.C., CARLQUIST, J.C.A., *Evaluatieonderzoek met betrekking tot de verkeersongevallenregistratie (VOR); Beschrijving en resultaten van het Vooronderzoek Carnets en de Proefregistratie Verkeersongevallen in de provincie Utrecht*, Voorburg, maart 1976, SWOV R-76-6, 39 blz + afbeeldingen en tabellen.
- BLOKPOEL, A., *Het aantal verkeersdoden volgens de doodsoorzakenstatistiek als schatting voor het aantal verkeersdoden volgens de verkeersongevallenstatistiek*, Consult ten behoeve van de Permanente Contactgroep Verkeersveiligheid (PCGV) (Subgroep Statistiek), Leidschendam, 1979, SWOV R-79-25, 18 blz.
- BOS, J.M.J., *Mobiliteit en veiligheid. Een verkenning van de literatuur*, Leidschendam, 1987, SWOV R-87-37, 18 blz.

BROUGHTON, J. et al., *Linkage of hospital Trauma Data and Road Accident Data*. TRL Report 518, 2001.

BULL, J.P., ROBERTS, B.J., *Road accident statistics - a comparison of police and hospital information*, 1973, *Accid. Anal. Prevent.*, vol. 5, n° 1, April, p. 45--53

CAMPBELL, F, WOODFORD, M., YATES, D.W., *A Comparison of injury impairment scale scores and physician's estimates of impairment following injury to the head, abdomen and lower limbs*, 38th annual proceedings, Association for the advancement of automotive medicine, September 21-23, 1994, Lyon.

CLAY, W., *Letselfevolgen van auto-inzittenden*. Dissertatie R.U.-Groningen.

COOPER, S., Henson, R., *Extending the quality and quantity of traffic accident related data*, in *Proceedings of the Conference Road Safety in Europe*, Birmingham, September 9-11, 1996, published by the Swedish National Road and Transport Research Institute, p. 189-202.

DEHAVEN, H., *The site, frequency and dangerousness of injury sustained by 800 survivors of light plane accidents*. *Crash Injury Research*, Department of Public Health and Preventive Medicine, Cornell University Medical College, New York, July 1952.

DERRIKS, H., DRIESSEN, L., *Huidige verkeersongevallengegevens. Het topje van de ijsberg*, Adviesdienst Verkeer en Vervoer, Rotterdam, 1994

FLURY, F.C., *Medische hulpverlening aan verkeersslachtoffers. Een beschrijvende literatuurstudie op basis van recente Nederlandse literatuur*, Leidschendam, 1987, SWOV R-89-47, 65 blz.

HAGENZIEKER, M.P., NOORDZIJ, P.C., *Onderzoek naar ongevallen met ernstige afloop in West-Zeeuwsch-Vlaanderen met behulp van processen-verbaal en verkeersongevallenregistratieformulieren*, Leidschendam, 1992, SWOV R-92-34, 31 blz.

HARRIS, S.M.A., *Veranderingen in de registratie van verkeersongevallen als gevolg van het stimuleringsplan "Actie -25%- Een haalbaarheidsstudie*, Leidschendam, 1990, SWOV R-90-18, 25 blz.

HARRIS, S.M.A., *Verkeersgewonden geteld en gemeten. Resultaten van een enquête gedurende één jaar naar de omvang van het aantal gewonden bij verkeersongevallen en de compleetheid*, 1989, SWOV R-89-13, 89 blz.

HARRIS, S.M.A., *Framework for consistent traffic an accident statistical data bases*, OECD Scientific Expert Group T8, SWOV, Leidschendam, 1988, 73 p.

HAUTZINGER, H., DÜRHOFT, H., HÖRNSTEIN, E, TASSAUX-BECKER, B., *Dunkelziffer bei unfällen mit Personenschaden; Bericht zum Forschungsproject 8503*, Bundesanstalt für Strassenwesen, Bergisch Gladbach, August 1993

HOPKINSON, P. G., *The social and environmental evaluation of the effects of new road schemes*, July 1992, Institute for Transport Studies, University of Leeds.

HOPKINSON, P. G., MAY, A. D., TURVEY, I.G., *The Relationship Between Pedestrians Assessment of Street Environments and Physical Conditions*, July 1987, Institute for Transport Studies, University of Leeds.

HOPKINSON, P. G., MAY, A. D., TURVEY, I.G., *The Influence of Town Centre Conditions on Pedestrian Trip Behaviour: Results from a Household Survey in 2 Locations*, 1987, Institute for Transport Studies, University of Leeds.

HOPKIN, J.M., MURRAY, P.A., PITCHER, M., GALASKO, C.S.B., *Police and Hospital Recording of non-fatal road accident casualties: a study in Greater Manchester, Berkshire*, 1993, Research Report 379 of the Transport Research Laboratory, 32 p.

IRTAD, *Underreporting of road traffic accidents recorded by the police, at the international level*. Irtad-report published by the Public Roads Administration, Norway, 1994.

KEIGAN, M. et al. *Linkage of STATS19 and Scottish hospital in-patient data-analyses for 1980-1995*. TRL Report 420, 1999.

KOORNSTA, M.J., *Current Statistical tools, systems and bodies concerned with safety and accident statistics*, Leidschendam, 1995, SWOV D-95-24, 15 p.

MAAS, M.W., *De politieregistratie van verkeersgewonden in ziekenhuizen. Een onderzoek naar de compleetheid, representativiteit en betrouwbaarheid van de registratie van in het ziekenhuis opgenomen verkeersgewonden*, Leidschendam, 1982, SWOV R-82-34, 45 blz.

MAAS, M.W., *Niet-geregistreerde verkeersdoden (schatting van het aantal verkeersdoden dat meer dan 30 dagen na het ongeval overlijdt ten gevolge van het opgelopen letsel)*, Vorburg, 1979, SWOV, 20 blz.

MACKENZIE, E.J., *Validation and application of the Injury Impairment Scale (IIS): a review of four papers*, 38th annual Proceedings, AAAM, September 21-23, 1994, Lyon, p. 176-184, 13 ref.

MCKINSEY & COMPANY (1985), *Bijlage bij rapport 'Naar een slagvaardig verkeersbeleid'*, Den Haag, Ministerie van Verkeer en Waterstaat, 1985

MINTON, R., *Police fatal road accident reports: phase II*. TRL Report 474, 2000.

MENS EN RUIJTE, *Diepte onderzoek dodelijke verkeersongevallen in België, mei 1997*, Studie in opdracht van het Belgisch Instituut voor de Verkeersveiligheid, Eindrapport, 216 blz.,

NEWMAN, J.A., TYLKO, S., MILLER, T. *Toward a comprehensive biomechanical injury cost model*, 36 annual proceedings, AAAM, October 5-7, 1992, Portland.

NICHOLSON, A.J., THIGHT, M.R., *Accident analysis and prevention: course Notes 1987/88*, jair 1989, Institute for Transport Studies, Working Paper 272, 152 p.

NICHOLL, J.P. *The use of hospital inpatient data in the analysis of injuries sustained by road accident casualties*. TRRL Report SR628, Transport and Road Research Laboratory, Crowthorne, 1980.

NOORDZIJ, P.C., *Behoeftte aan gegevens over verkeersongevallen*, Leidschendam, 1995, SWOV R-95-71, 56 blz.

NOORDZIJ, P.C., HAGENZIEKER, M.P., GOLDENBELD, CH., *Analyse van verkeersongevallen van originele politierapporten*, Leidschendam, 1994, SWOV R-94-9, 6 blz.

OECD (Scientific Expert Group T8), *Framework for consistent Traffic and Accident Statistical Data Bases*, Leidschendam, 1988, SWOV, 16 p.

O'MALLEY, K.F., YOUNG, G., QUINN, B., UNKLE, D.W., ROSS, S.E., *Relationship of Injury Severity to Hospital Resource Utilization*, in 32nd Annual Proceedings Association for the Advancement of Automotive Medicine, September 12-14, 1988, Seattle, p. 157-180

PASSIES, G., *Verkeersslachtoffers. Ernst van de verwondingen*, 1987, R.U.-Groningen

POLAK, P.H., *Hoe groot zijn de 'werkelijke' aantal verkeersslachtoffers*, Leidschendam, 1995, SWOV R-95-15, 19 blz.

POLAK, P.H., *Opstellen en testen van de onderzoeksopzet voor het ongevallenonderzoek als onderdeel van het evaluatieonderzoek van het stimuleringsplan. Actie -25%*, Leidschendam, 1990, SWOV R-90-40, 40 blz.

ROSZBACH, R., WITTINK, R.D., WEGMAN, F.C.M., *Duurzaam-veilig wegverkeer: van concept naar uitvoering. Eindrapportage van het project.*, Leidschendam, 1996, SWOV R-96-34, 108 blz.

SANDE, J., THORSON, J., *An evaluation of the official Swedish statistics on seriously injured in road traffic accidents*, 1975, Scand. J Soc. Med. 3: 5-11

SIG, *Classificatie van ziekten, deel 1*, Stichting Medische Registratie, Utrecht, 1979.

SIG-, *Vergroting efficiëntie bestaande registraties ten behoeve van beleidstoepassingen, fase; Eindrapport*, in SIG-zorginformatie, Utrecht, 1993



SIMPSON, H.F., *Comparison of hospital and police casualty data: a national study*. TRL Report 173, 1996.

SIMPSON, H.F., *National hospital study of road accident casualties*. TRL Report 272, 1997.

STONE, R.D. *Computer linkage of transport and health data*. TRRL Report LR1130, Transport and Road Research Laboratory, Crowthorne, 1984.

TEPAS, J.J., CROOMS, C.B., MOLLITT, D.L., STRING, D.L., RAMENOFKY, M.L., KITCHENS, L., DISCALA, C., *Inter-Rater reliability of the Injury Severity Score and Abbreviated Injury Score*, 33rd annual proceedings, AAAM, October 2-4, 1989, Baltimore, p. 183-190.

TWISK, D.A.M., MULDER, J.A.G., *Verzekeringsmaatschappijen en verkeersongevallen*, Leidschendam, 1992, SWOV R-92-38, 19 blz.

UNECE, *Statistics of Road Transport Accidents in Europe (definitions of the Vienna Conventions of Road Traffic 1968)*

VAN KAMPEN, L.T.B., TROMP, J.P.M., BLOKPOEL, A., *Jaaranalyse VIPORS 1994*, Leidschendam, 1995, SWOV R-95-77, 44 blz., 8 bijlagen.

VAN KAMPEN, L.T.B., *Compleetheid en representativiteit van VIPORS 1995*, Leidschendam, 1996, SWOV R-96-30, 62 blz.

VAN KAMPEN, L.T.B., *Verkeersslachtoffers in PORS*, Leidschendam, 1994, SWOV R-94-26, 17 blz., 3 bijlagen.

VAN KAMPEN, L.T.B., BLOKPOEL, A., *Beoordeling van de compleetheid en representativiteit van VIPORS, over het jaar 1994*, Leidschendam, 1996, SWOV R-95-78, 60 blz.

VAN KAMPEN, L.T.B., *Analyse van letselgegevens van fietsers en voetgangers. Ten behoeve van de beveiliging van zwakke verkeersdeelnemers*, Leidschendam, 1991, SWOV R-91-56, 40 blz.

VERHOEF, P.J.G., *Politierregistratie van het gebruik van MVO. Onderzoek naar de betrouwbaarheid en de bruikbaarheid van door de politie ingevulde ongevalformulieren voor wat betreft MVO-gebruik*, Leidschendam, 1991, SWOV R-91-74, 27 blz.

VON KOCH, M., NEYGREN, A., TINGVALL, C., *Validation of the new Injury Impairment Scale (IIS)*, 38th annual proceedings, AAAM, September 21-22, Lyon, 1994, p. 123-137.

VON KOCH, M., KORNER, J., NORIN, H., NYGREN, A., TINGVALL, C., *Injury Severity Assessment for car occupants using Disability Scaling*, 36th annual proceedings, AAAM, October 5-7, 1992, Portland, p. 251-267.

WORLD HEALTH ORGANIZATION, *International classification of impairment, disabilities and handicaps*, Geneva, 1980.

YATES, D.W., WOODFORD, M., CAMPBELL, F., *Preliminary validation study of the Injury Impairment Scale*, 38th annual proceedings, AAAM, September 21-23, 1994, Lyon.

YATES, D.W., HEATH, D.F., MARS, E., TAYLOR, J.J., *A system for measuring the severity of temporary and permanent disability after injury*, 33rd Proceeding, AAAM, October 2-4, 1989, Baltimore, p. 219-229.

ZIEDLER, F., MATTERN, B., EICHENDORF, W., *Development of a new injury cost scale*, 33rd annual proceedings, AAAM, October 2-4, 1989, Baltimore, p. 231-247.

### **Useful literature:**

AGRAN, P.F., CASTILLO, D.N., WINN, D.G., *Limitations of data compiled from police reports on paediatric pedestrian and bicycle motor vehicle events*, in: Proceeding of the 33rd annual conference of the Association for the Advancement of Automotive Medicine AAAM, Baltimore, October 2-4, 1989, p. 57-72.

AUSTIN, K.P., *The identification of mistakes in road accident records - Part one: The use of geographic information systems*, Institute for Transport Studies, Leeds, 1994, Working Paper 406, 18 p.

BEECK, E.F., VAN HERTOOG, P.C., DEN MEERDING, W.J., MULDER, S., ZANTVOORD, H., *Een model ter berekening van de directe medische kosten van letsels: verslag van de eerste fase*, Amsterdam, 1996, Stichting Consument en Veiligheid, Interim-rapport nr. IR 159, 101 blz.

BONSALL, P.W., PALMER, I., WATSON, S.M., *Automatic monitoring of decelerations as a source of data on accident risk, Final report on project N GR/F/62025*, Institute for Transport studies, Leeds, 1992, Working Paper 385, 48 p.

DE LANGE, L, *De Tripod-methode toegepast op verkeersongevallen: bruikbaarheid en beperkingen*, Leidschendam, 1993, SWOV, R-93-50, 36 blz.

GUSTAFSSON, H., NEYGREN, A., TINGVALL, C., *Rating system for serious consequences (RSC) due to traffic accidents: risk of death or permanent disability, 10th International Technical Conference on Experimental Safety Vehicles, Oxford, July 1-4, 1985, p. 556-560.*

HOPKIN, J.M., JAMES, H.J., O'REILLY, D.M., *The distribution of injury severity in serious road accident casualties*, in Road accidents Great Britain, 1990, p. 50-55.

KRISHNAN, K.S., CARNAHAN, J.V., *Analysis of the effect of car size on accident injury probability using automobile insurance data*, in Accid. Anal. Prev., 1985, 17 (2), 171 p.

OUDE EGBERINK, H.J.H., *Diepgaand onderzoek van verkeersongevallen, verslag van het analyseteam DOVO*, Delft, juni 1987, TU Delft, 50 blz.

OZANNE-SMITH, J., HAWORTH, N., *Development of data collection methodology: crashes resulting in hospitalisation and casualty crashes not resulting in hospitalisation*, Canberra, ACT, 1993, Federal Office of Road Safety FORS Report No. CR 120, 119 p.

THIGHT, M.R., CARSTEN, O.M.J., KIRBY, H.R., SOUTHWELL, M.T., LEAKE, G.R., *Urban road traffic accidents: an in-depth study*, In: Traffic management and road safety: proceedings of a seminar held at the 18th PTRC European Transport and Planning Summer Annual Meeting, University of Sussex, September 10-14, 1990, p. 193-204.

## **5.2 Publications**

DE MOL, J., *Impact van de verkeersonveiligheid en -onleefbaarheid, objectieve verkeersonveiligheid*, eindrapport, Gent, CDO-RUG, 1999, 191 blz. + bijlagen.

DE MOL, J., *'Toename aantal verkeersdoden gevolg van betere registratie van slachtoffers'*, Financieel Economische Tijd, Podium, 08 08 1999, blz. 2.

DE MOL, J., *'Beleidsaanbevelingen'*, in: Verkeersspecialist, Diegem, Kluwer Editorial, N° 58, april 1999, pp. 20-21.

DE MOL, J., *'Hoe doen ze het? En hoe dikwijls? Enquête verplaatsingsgedrag Gentse studenten'*, in: Verkeersspecialist, Diegem, Kluwer Editorial, N° 58, pp. 19-20.

DE MOL, J., *'Is het statistisch materiaal even onveilig als het verkeer?'*, in: Verkeersspecialist, Diegem, Kluwer Editorial, N°56, februari 1999, pp. 7-12.

DE MOL, J., *'Slechts het topje van de ijsberg (verkeersonveiligheid in statistieken)'*, in: Verkeersspecialist, Diegem, Kluwer Editorial, N°57, maart 1999, pp. 7-12.

DE MOL, J., *"Optimalisatie van de verkeersongevallenstatistieken, Inleiding tot STRADA"*, Gent, februari 2002, 20 blz.

DE MOL, J., *"Opteren voor OPTIMA, Betrouwbaar registratiesysteem voor verkeersslachtoffers"*, in Verkeersspecialist, Diegem, Kluwer-Editorial, Nr 87, april 2002, blz. 5-8.

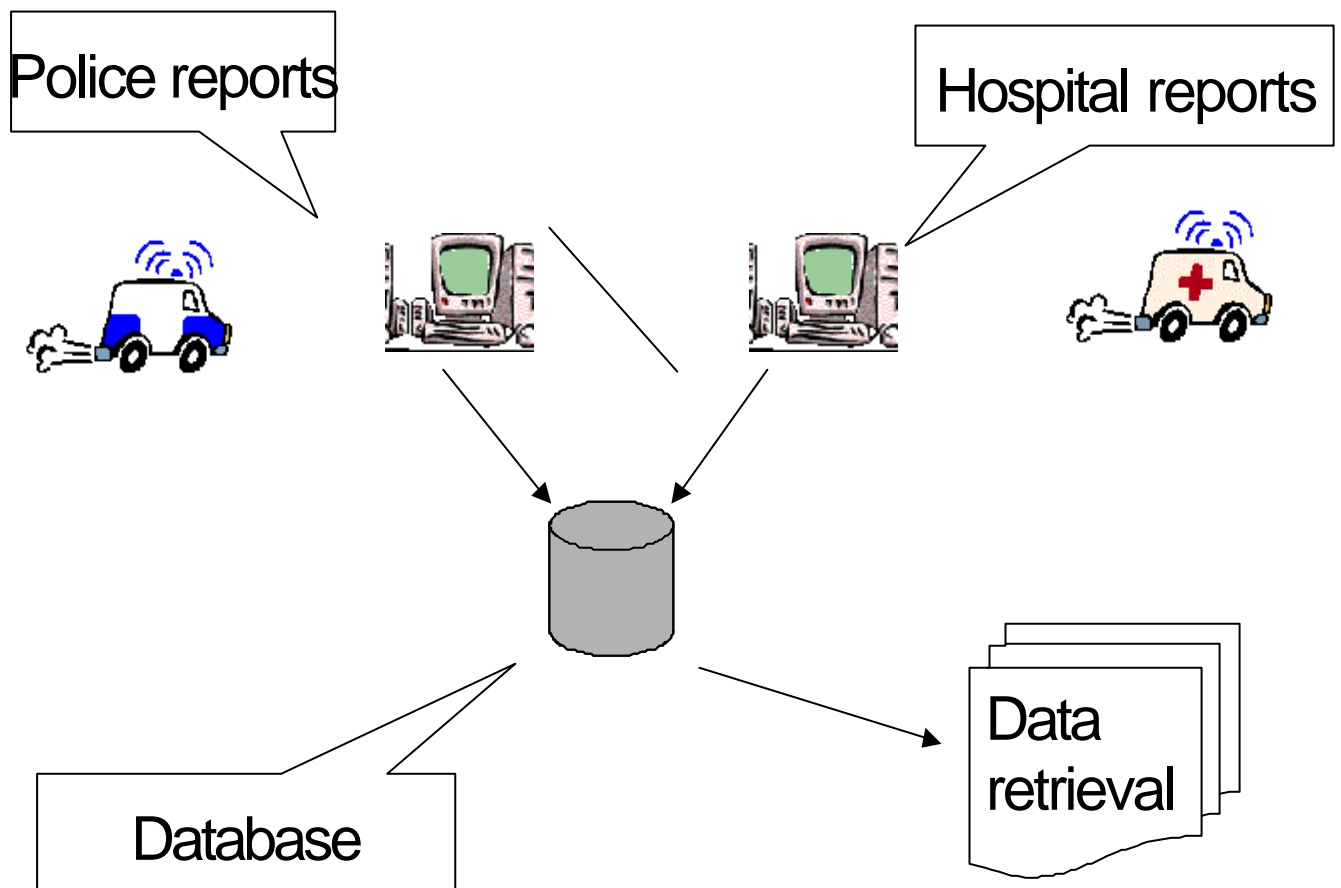
### 5.2.1.1.1 Proceedings of scientific conferences or events

- 07 04 1999 RONDE TAFEL "VERKEERSVEILIGHEID-VERKEERSONGEVALLEN",  
Brussel, Agalev-studiedienst
- 09 12 1999 "GEMEENTELIJK VERKEERSBELEID IN DE PRAKTIJK",  
Heist op den Berg, Belgisch Instituut voor Verkeersveiligheid, Langzaam Verkeer,  
Vereniging van Steden en Gemeenten, Vlaamse Stichting Verkeerskunde
- 18 01 2000 "ACTIES VOOR EEN ENERGIEZUINIG EN VEILIG RIJGEDRAG"  
Brussel (autosalon); VITO, BIVV, FEBIAC; Publicatie: DE MOL, J., *Mogelijkheden  
voor snelheidsbeheersing, Relatie snelheid Verkeersonveiligheid*, Gent, januari 2000.  
In BRUNEEL, H, CRAPS, R., GOVAERTS, L., *Acties voor een energiezuinig en veilig  
rijgedrag*, Vito, 2000/V&M/R/001, januari 2000
- 23 12 2000 "DODENWAKE"; Antwerpen; Voetgangersbeweging
- 02 03 2000 "HET TRANSPORT: HET MILIEU EN DE VEILIGHEID"; Brussel; DWTC;  
Publicatie in: D.W.T.C., het transport en de veiligheid, Le transport: l'environnement et  
la sécurité, Impact van verkeersonveiligheid en -onleefbaarheid: Objectieve en  
subjectieve factoren, 5 blz. Brussel, maart 2000.
- 25 03 2002 "TOEKOMSTDEBAT OVER MOBILITEIT. KLEURRIJK VLAANDEREN";  
Antwerpen; KNACK
- 25 07 2002 DEBAT "1.300 DODEN JAARLIJKS IN HET BELGISCH VERKEER, DAT MOET  
JE VERDIENEN, ELKE DAG"; Gent; Vzw Trefpunt
- 23 10 2002 RADIODEBAT "VERKEERSVEILIGHEID"; Gent, Aula universiteit; Radio 1
- 23 11 2002 DEBAT "NAAR MEER VERKEERSVEILIGHEID"; Gent; Open Trefmoment  
AGALEV

## 5.3 Illustrations

### 5.3.1 Structure of STRADA

# STRADA Overview



### 5.3.2 Accident description

Strada policeclient - edit

File Settings Report Help

New Save File Close Overview Search Look... Print Help Date Position Road/Traffic Traf.El. Acc.Desc.

**Traffic element**

TE 1 Personbil | TE 2 Personbil

Check registration number  Yes  No

Nationality:    
 Reg.number:

Number of trailers:  0  1  2

Nationality:  Reg no. trailer:    
 Nationality:  Reg no. trailer:

Driving practice   
 Yes  No   
 Private  Driving school

Number of people in the vehicle:   Driver missing/unknown   
 Number of injured passengers:

Other information   
 Stationary vehicle   
 Parked vehicle   
 Overtaking   
 Drove into fixed object   
 Drove off the road   
 Reversed

Collision point (one or several): 


	Naionality	Personal no	D/P	Placement	Injury level	Influe	Age	Sex
1	Sverige		F	Övrig/okänd plats	Uppgift saknas	N	999	U

### 5.3.3 Surroundings and circumstances of the accident

**Strada policeclient - edit** File Settings Report Help

New Save File Close Overview Search Look... Print Help Date Position Road/Traffic Traf.El. Acc.Desc.

#### Road and Traffic

<b>Road number/road name</b> A <input type="text" value="R. F. Bergsgatan"/> <input type="text"/> B <input type="text" value="Hyllie Kyrkoväg"/> <input type="text"/>		<b>Traffic instructions</b> Major road <input type="radio"/> A <input type="radio"/> B No major road <input type="radio"/> A <input type="radio"/> B		<b>Traffic regulation</b> No left turn <input type="checkbox"/> A <input type="checkbox"/> B Obligation to stop <input type="checkbox"/> A <input type="checkbox"/> B Duty to give way <input type="checkbox"/> A <input type="checkbox"/> B Other regulation <input type="checkbox"/> A <input type="checkbox"/> B	
<b>Road type</b> Motorway <input type="radio"/> A <input type="radio"/> B Major road <input type="radio"/> A <input type="radio"/> B Other general road <input type="radio"/> A <input type="radio"/> B Street <input type="radio"/> A <input type="radio"/> B Private road <input type="radio"/> A <input type="radio"/> B Other road <input type="radio"/> A <input type="radio"/> B		<b>Max speed limit</b> 30 km/hour <input type="radio"/> A <input type="radio"/> B 50 km/hour <input type="radio"/> A <input type="radio"/> B 70 km/hour <input type="radio"/> A <input type="radio"/> B 90 km/hour <input type="radio"/> A <input type="radio"/> B 110 km/hour <input type="radio"/> A <input type="radio"/> B Other <input type="text"/> A <input type="text"/> B		<b>Traffic signal</b> In operation <input type="radio"/> A <input type="radio"/> B Out of order <input type="radio"/> A <input type="radio"/> B Yellow blinking <input type="radio"/> A <input type="radio"/> B Missing... <input type="radio"/> A <input type="radio"/> B	
<b>Weather conditions</b> <input type="radio"/> Dry <input type="radio"/> Haze/fog <input type="radio"/> Rain <input type="radio"/> Rain/snow mix <input type="radio"/> Snowfall <input type="radio"/> Unknown		<b>Road conditions</b> <input type="radio"/> Roadway - dry <input type="radio"/> Roadway - wet / damp <input type="radio"/> Thick ice / packed snow <input type="radio"/> Thin ice / roadway visible <input type="radio"/> Unknown		<b>Traffic environment</b> <input type="radio"/> Populated area <input type="radio"/> No populated area <input type="radio"/> Unknown	
<b>Light conditions</b> <input type="radio"/> Daylight <input type="radio"/> Darkness <input type="radio"/> Dawn/Twilight <input type="radio"/> Unknown		<b>Road/street lighting</b> Turned on <input type="radio"/> A <input type="radio"/> B Turned off <input type="radio"/> A <input type="radio"/> B Missing <input type="radio"/> A <input type="radio"/> B		<input type="button" value="Clear all fields"/>	
<b>Bridge</b> <input type="radio"/> Yes <input type="radio"/> No		<b>Tunnel</b> <input type="radio"/> Yes <input type="radio"/> No		<b>Roadworks</b> <input type="radio"/> Yes <input type="radio"/> No	
<b>Series of accidents</b> <input type="radio"/> Yes <input type="radio"/> No					

### 5.3.4 Hospital information

**Sår**

Typ	Detalj
DJ Djup sårskada	
YT Ytligt sår	

Penetration

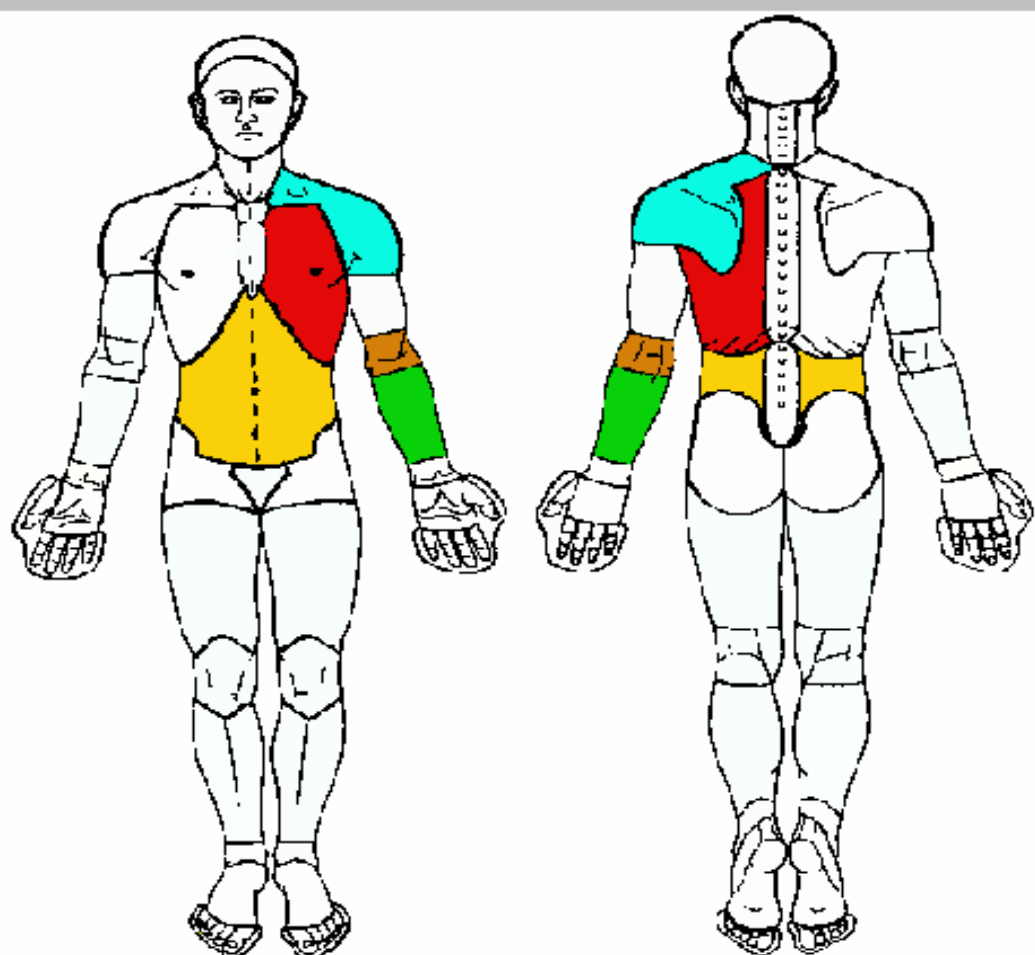
**VÄLJ SKADA**

	KLARTEXT
1	Laceration på torax; främre del
2	Laceration på torax; bakre del
3	Laceration på bröstkörtel
4	Avulsion på torax; främre del
5	Avulsion på torax; bakre del

DAFEA UNS  
 DAFEB yttlig (mindre)  
**DAFEC >20cm; genom subcutis; <=20% blodförlust**  
 DAFED >20% blodförlust

ICD Svensk §21.2    AIS 2    Sv. Ortop. för

**Injury marking**



- 
- 
- 
- 
- 
-

**Type of injury**

- Wound
- Crush / squeeze
- Twist luxation
- Fracture
- Inner organ
- Other

**MAS AIS**  
3

**Body part MAIS**  
17

**ISS**  
17

**E-code**  
0000

List

Ready

### 5.3.5 Standard report

**STRADA - Uttagshanterare**

Arkiv Visa Verktyg Hjälp

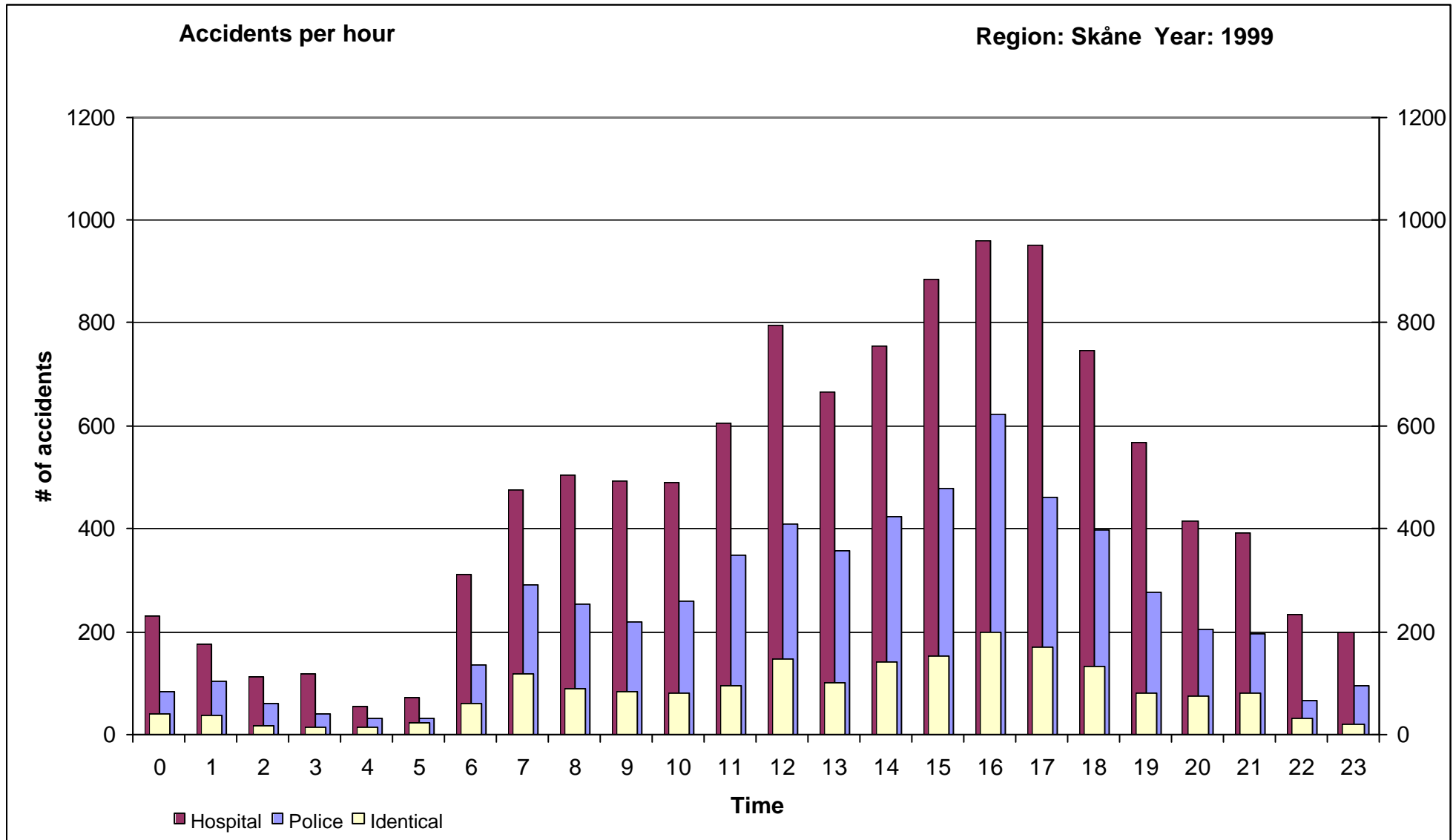
X: 6404558 Y: 1272362 Skala: 1:4614 Längd:

1 rapporter med osäker/ingen position

- Olycksid: 3 Q:0
- Olycksid: 19 Q:0
- Olycksid: 24 Q:0
- Olycksid: 378 Q:0
- Olycksid: 1270 Q:0
- Olycksid: 1280 Q:0
- Olycksid: 1305 Q:0
- Olycksid: 1320 Q:0
- Olycksid: 1524 Q:100
- Olycksid: 1525 Q:100
- Olycksid: 1530 Q:0
- Olycksid: 1719 Q:0
- Olycksid: 2132 Q:0
- Olycksid: 2250 Q:0
- Olycksid: 2488 Q:97
- Olycksid: 2655 Q:73
- 1999-01-14 13:50:00 U**
- 1999-01-14 12:00:00 -
- 1999-01-14 10:30:00 -
- Olycksid: 2766 Q:0
- Olycksid: 2882 Q:0
- Olycksid: 2909 Q:100
- Olycksid: 2918 Q:98
- Olycksid: 3284 Q:0



5.3.6 Output example





## 5.4 Questionnaire

### Questionnaire: investigation of 'best practices' in exploitation of traffic safety data

Registration of road casualties in medical services

The goal of the questionnaire is to get an overview of the collection of data on road casualties in the medical sector. It may be that several registration systems coexist.

*Please, type in your answers in the answer frames. They will grow as you type. It may be that certain questions do not apply. If so, please, indicate so.*

You can also exchange the questionnaire or parts of it in order to get the most accurate information from the most appropriate person.

We are looking forward to receiving this filled out questionnaire before August the 1<sup>th</sup>.  
Thank you very much for you collaboration.

#### A general question on the possible data channels:

G1. Which services register road casualties automatically: emergency units, hospital (in-patients/outpatients), general practitioners, coroners,...?

#### Questions on specific data sources. This format can be used for the description of each individual data source.

##### S1. General

S1.1 Name of the data source.

S1.2 Global description of the content of the data.

S1.3 For what purpose(s) is this data collected?

S1.4 Which organization is funding the data collection?

S1.5 Is the collected data complete and representative?

##### S2. Data Collection

S2.1 Which organization collects the data?

S2.2 Describe briefly the procedure, starting from the moment a patient comes in.

S2.3 How is it determined that one has to do with a victim of a road accident?

S2.4 Are any variables of the accident registered? Which? How? (interview?)

S2.5 Are injury scales (ICD, AIS, ISS,...) used?



S2.6 Is data on the cost and/or outcome of the treatment collected?

S2.7 Does the registration interact with the road accident registration by police forces?

S2.8 If applicable, what is the procedure when a dead person is brought to the hospital? What is the interaction with police and/or judicial services?

S2.9 If applicable, what is the procedure when the patient dies during treatment?

S2.10 How is the data collected (questionnaires, standard form, PC-application)?

S2.11 Is the data collection integrated in general management system?

### S3. Data processing

S3.1 In what manner are the patient data processed further?

S3.2 Which organization carries out the data processing?

S3.3 Is there integration of the data with the data of the police services?

S3.4 If so, how? How are patient and police data linked? At which level of detail?

S3.5 If so, are there any legal issues? (privacy, medical secret, judicial aspect, prosecution,...)

S3.6 In which form is the data published? (internet, report, tables,...)

S3.7 What is the frequency of publication?

### S4. Users

S4.1 Is the data public?

S4.2 Which organizations use the data?

S4.3 Do the users have to pay to get the data?

### S5. Problems?

S5.1 Give a short description of known problems.

S5.2 Do any projects exist that try to amend these problems?

#### 5.4.1.1.1 Remarks

R1. Do you have any remark on this questionnaire or would you like to add something?