Roads Department

**Ministry of Regional Development
and Infrastructure**

Project Name: *Third East-West Highway Improvement Project*

Loan No. 7741-GE

DEVELOPMENT OF A ROAD CRASH DATA BASE IN GEORGIA

Phase 1

Final report

Tbilisi, Georgia

March, 2011

Submitted by

SWEROAD

Design supply and installation of a road crash data base

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Abbreviations

AIS	Abbreviated injury scale. Values 0-6. One value for each injured body part
ECMT	European Conference of Ministers of Transport
GeoStat	National Statistics Office of Georgia
ISS	Injury severity score. Values 0-75. Used for weighing AIS from different parts of the body
MAAP for windows	Crash data base developed by Transport Research Laboratory (GB)
MIA	Ministry of Internal Affairs
MLHS	Ministry of Labour, Health and Social Affairs
MRDI	Ministry of Regional Development and Infrastructure
OECD	Organisation for Economic Cooperation and Development
PPD	Patrol Police Department (in MIA)
RD or RDMRDI	Roads Department of the Ministry of Regional Development and Infrastructure
RFP	Request for Proposals
RSMS	Road Safety Management System. A crash data base developed in Kerala India
STRADA	Swedish Traffic Accident Data Acquisition. The Swedish crash data base
TEWHIP	Third East-West Highway Improvement Project
TL	Team Leader
ToR	Terms of Reference
WB	World Bank
WHO	World Health Organisation

Design supply and installation of a road crash data base

Preface

This is the Final Report of phase 1 in the project "development of a road crash data base in Georgia"within the *Third East-West Highway Improvement Project*
The project started on May 25, 2010. The Client for the project is Roads Department within Ministry of Regional Development and Infrastructure.

The report describes findings and recommendations from investigations, analysis, coordination group meetings and discussions during the consulting services.

Much of the material in this report is based on reports finalized during the project. One seminar has been held focusing on the benefits that can be utilized with a modern crash data base. A coordination group was appointed and had 3 meetings.

The consultants want to thank representatives in the coordination group for many fruitful discussions and numerous persons in roads department for their support.

Special thanks to the staff at the road safety office that have provided office space in their office, given valuable support and arranged coordination group meetings and a seminar. Also a special thanks to the persons dealing with the crash data at Patrol Police Department in Tbilisi whose support and willingness to help has been great.

Executive summary

Road safety work in Georgia is in need of a crash data base.

Crash data collecting procedures today are not efficient enough. Because of lack of a modern computerized data base, recording of crash data is done in Word files in PPD stations and in Excel files in analytical unit of PPD. Only basic information is stored in these Excel files.

Because of the above mentioned fact no comprehensive analysis is made of the road safety situation and its development. The road safety situation is only monitored with basic quarterly data. The identification of black spots on international roads is made by Road Safety Unit of the Roads Department.

Cooperation between different stake holders has been improved. It is recommended to let the coordination group that was created during the project time, be permanent and meet on regular (monthly) basis.

The very positive experience is that all persons and stakeholders I have met are eager to work together and change the situation to decrease casualties in Georgia.

In a predecessor to this project the conclusion was[1]:
"We strongly emphasis the urgent need to develop or adapt a modern, functional database system for handling accident data in Georgia"
The road safety action plan for Georgia 2009-2013 states "Accident data system to be established at Patrol Police and data shared with Roads Department and other stakeholders. Includes technical and advisory support during 3 years"

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[1] Analyze Traffic Safety Issues and Propose Solution Packages on the East-West Highway from Red Bridge to Poti and on other Main Roads

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Experience from good practise countries shows a good road safety work can only be reached with a good data base with data shared between stakeholders.

Another objective has been to get a more detailed description of the present flow of crash data reporting and distribution of results. The present procedures for crash data handling has been discussed in detail with the Patrol Police Department. Meetings with users such as roads department, Tbilisi city and statistical bureau was performed to see how crash data were distributed to them and how it was used.

A new crash data form has been agreed on in the coordination group. It was tested in 3 police stations in Kvemo Kartli region during February. Each station has been equipped with a GPS tool so that the crash location can be accurately defined. The result was positive. The attending police men thought that the new form was much simpler to fill in compared with the present used form. They wanted to have the new form introduced immediately.

The it department of MIA has introduced mobile computers in 200 police cars. The computers are equipped with gps location tools and connects with MIA headquarters via mobile. This should be developed to be used for capturing crash data.

Specifications for a new data base have been the main object of this project. It is valuable if the procurement/development of a crash data base (phase 2) can be made in close proximity to the finalisation of this phase 1 of the project. The financing should be decided as soon as possible.

Main suggestions

There shall be two parallel development paths to be followed. One to introduce the new form to the police stations and to have it installed in the tablet computers used by the patrol police. This shall be done as soon as possible since it does not have to wait for the new software. The other path is to start the process for procurement the soft ware to a new crash data base.

Main objective of project

The overall purpose is to design and implement a crash database for Georgia. This will be done in two phases:
1) Review of existing situation and design of system, and
2) Supply, installation and validation of the system.

Page 47 in the Request for Proposals (RFP) states that:

> *The aim of the assignment is to supply and install an adequate, country-wide system of crash and injury data collection, storage, retrieval and analysis, which permits: comprehensive analysis of the road safety situation in Georgia; information dissemination to all potential users; and appropriate remedial measures to be devised.*

It is furthermore stated that:

> *It is intended to achieve this aim in two phases: (i) design a system to reflect the existing situation, options for improvement, design of an improved system and (ii) supply and installation of a system and its testing and validation.*

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The work is carried out in the context of the World Bank funded Third East-West Highway Improvement Project (TEWHIP). The Roads Department of the Ministry of Regional Development and Infrastructure is the Client.

This report covers phase 1.

Final report

The Final report is stated in the ToR and is planned in the inception report according to the following time schedule

		2010						2011	
	6	7	8	9	10	11	12	1	2
Reports									
Inception Report	X								
First Interim Report			X						
Second Interim Report						X			
Draft Final Report								X	
Final Report									X
Resourses									
Kent Sjölinder			3 weeks			3 weeks		3 weeks	
Erkan Inan			2 weeks			2 weeks			
Alexander Aslanishvili									
Local experts									
Foreign expert in Georgia									
Foreign expert working from home (part time)									

This final report follows that time schedule. However there seems to be an inconsistency in the time between draft final report and final report. It is only planned for one month. The client shall have one month to consider and give comments to the draft. After that SweRoad shall have one month to consider comments and deliver the final report. This is in total 2 months.

A new system

This report from Phase 1 must be followed by phase 2 as soon as possible.

There is a problem that the financing of phase 2 is not yet decided. Buying and adopting an available modern system is expensive. Potential bidders have been approached to see what prices might be expected. The prices vary to a large extent. It is maybe not until the bids are delivered that we can see the accurate cost.

The IT department at MIA has in the early part of this project raised concerns about having foreign systems in their environment. They are in favour of making the development themselves.

The advantage with buying and adopting an available system is that it will be fast to introduce and there are guaranties that the system will function.

The IT department has very professional and competent leaders and personal. But developing a system can take long time and will be dependent on a few developers. Even if the development is successful

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the system will depend on the persons that make the development. Experience from development also shows that it is easy to underestimate the complexity of the development, making time and resources needed for development much larger than initially estimated.

The specifications described in this report can be used regardless of the new system is bought or developed.

It is the opinion of the project that buying an existing system is the best option. If however the decision is to develop an in-house Georgian system, SweRoad only want to point out that such a project might be underestimated in relation to the time it takes, the costs involved and the complexity, and that sufficient preparation is done in order to secure a successful result.

We have in the project further investigated into the prices asked by soft ware suppliers. The prices differ from 100 00 US$ to 300 00 US$ for MAAP. RSMS and Via STAT. The American system AIMS has prices noted on their website. An installation with 5 userlicences costs 25 000 US$. Even if translation and adoption to Georgian circumstances will increase this figure it is very low compared to the other developers, It is first at the bidding we can get the exact price.

The plan ahead

Month 0	Acceptance of final report	
	Soft ware development	**Deciding and installing new form**
Month 1	Decison on financing. Decision on buying an existing or developing a new system. If the decision is to buy an existing system bidding documents for crash data base shall be prepared based on the specifications in this report	Preparing formal decision to replace existing form with the new proposed.
Month 2	Time for suppliers to supply bids.	Formal decision to replace existing form.
Month 3-4	Evaluation of systems. Selecting supplier. Contract negotiations and signing	Installation of new form into mobile computers. Arranging for storage of data. Training in filling in the new form-
Month 5-6	Adjustment of system to Georgean conditions.	
Month 7-8	Installation, Training	

This plan is based on buying and adopting an existing system. This time schedule makes it possible to have a new system installed and in use from Jan 2012 if it is followed.It has to be decided probably at a deputy ministry level that the different stake holders are allowed to get access to non personalised data.

New crash data form and pilot testing

A new form has been developed and its content and layout decided in the coordination group. The form was tested in 3 police stations in Kvemo kartly region for one month with start February 1.

The test area covers Rustavi city, international road S04 Rustavi- red bridge (Azerbaijan border) and international road S06 Marneuli-Sadakhlo. The testing started with training during one day for involved persons on items, definitions, sketches and using GPS for localisation.

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Each police station has been equipped with a GPS receiver (Garmin etrax H) for locating the crash site. The crash form is attached as appendix 1.
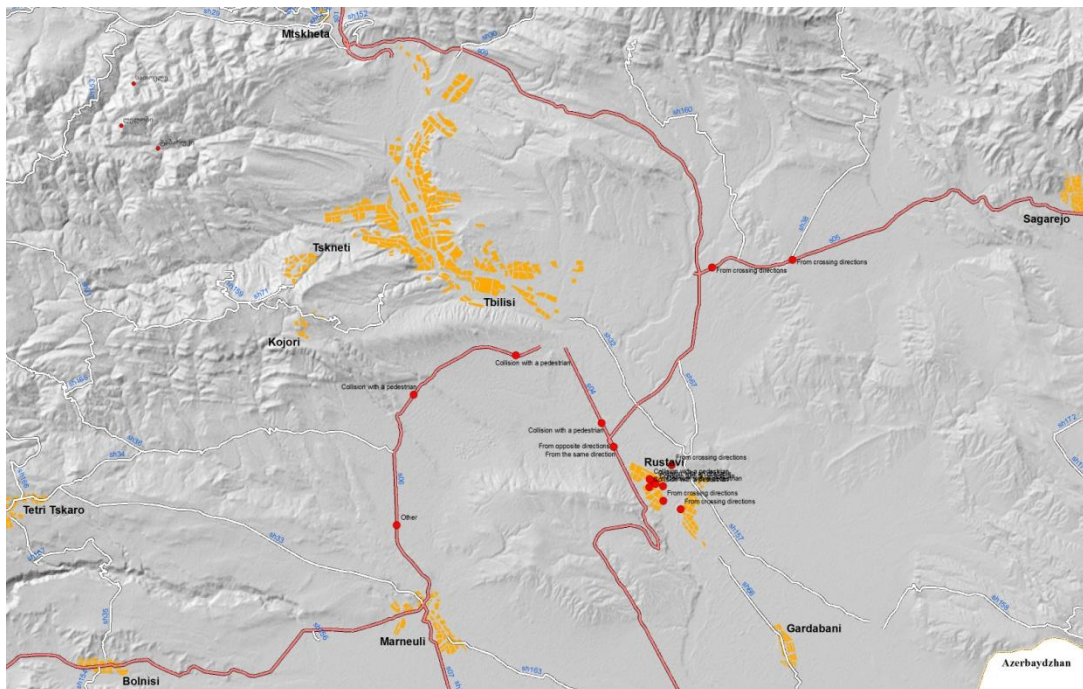
Reported crashes are shown in the picture above. The crash type is printed together with the symbol. The locations are shown with the help of the GIS system used in the roads department. The result shows that the location coding has been working. However with the new computers with the GPS built in there will be no filling in of coordinates by hand. The coordinates will be in electronical format from the beginning.

Patrol police uses computers in police cars

In the end of the project we learned that 200 Patrol Police cars were equipped with computers.
Each computer is equipped with GPS location tools. There is also a printer and a camera.

Information from the computer is sent to IT department via mobile net
With the GPS they can see where every car is. It is displayed on Google maps. Today there are no Georgian roads in Google maps but the government has sent data to Google for updating. The police car driver can mark if he is busy or idle or if he needs help. This is shown with different colours on the map. The computers have forms installed for registering fines.

This have existed for 2 months.The computers are mobile and can also be used outside of the car.

If for instance we want to install a program in the computers it is done over the net. This makes it very easy.

The computer model is Xplore IX 104 C¤.

It is possible to install the crash data form in these computers. Thus making it unnecessary to write on paper and to send paper forms. The GPS will also give the correct crash location. IT department

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estimates that it will take 1-2 weeks to install the form if decided. If crash data can be captured in this way it means that the number of installations of software for a crash data base can be decreased. The price asked by the suppliers often depends on the number of installations.

The computers are connected to LAN. Use windows 7. Used for touch screen.

On the computer it is possible to sign the fines and the driver signs that he accepts it. So it can be used to draw sketches when reporting accidents.

It is therefore easy to realise that accident reporting should use the same equipment. In this case the paper reporting can be awoided. The accident form need to be installed in the computers and procedures for storage in the IT department has to be made. IT department estimates the time for this to 1-2 weeks of work.

This together with the result from the pilot test leads us to the conclusion that an urgent work is to officially decide the form and add it into the computers. This is not dependent of the new data base but can be done independently and parallel with data base development.

Coordination group

A coordination group on crash data was created and has held 3 meetings. The group is at the same organisational level as the expert group on road safety at the transport policy department. Some people are members of both groups.

The meetings were focused on describing the need of data from respective organisation and to transform these needs onto a form for capturing crash data.

The meetings were very fruitful, with good discussions. The form to be used for pilot testing has been agreed on. The proposed flow of information with a new crash data base was agreed on. The flow of information is shown in this report. The form is shown in appendix 1.

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The coordination group that has been established during the project shall continue as a coordination group during the implementation. It is very important that producers and users meet and deal with progress and problems and improvement possibilities.

During the project time the invitations to meetings have been done by the road safety office and the chairman has been the SweRoad team leader. It is necessary to continue with the group on a permanent basis and to have the chairperson from a Georgian organization. The present system with invitations from the road safety unit has been successful and can be continued with the road safety unit as the organizing unit. The questions dealt with will be many practical on the collection of data and on the data base. For this reason it can be an advantage to have the chairperson of the meetings belonging to the collecting organization which is the patrol police. Members of the coordination group have been:

Mr. Spiridon Kokhreidze	Roads Department
Mr. Mamuka Patashury	Roads Department
Ms.Nino Lochosvili	MoH
Mr. Demoir Kvirikasvili	Tbilisi city
Mr. Temour Udzilauri	Tbilisi city
Mr.Tamaz Jikia	PPD
Ms.Marina Latsabidze	PPD
Mr. Ednar Mgeladze	MIA
Ms. Lia Charekishvili	National statistics office of Georgia

Planning should be done for meetings once a month. In the start up phase of the crash data base it may be necessary with more frequent meetings and also when there is a need with specific issues to address. Persons working with the road safety strategy and action with action plans must be invited whenever necessary.

The chairperson of the coordination group shall oversee the activities of the working group, monitoring progress, and ensuring that all those directly involved (as well as other key stakeholders) are kept well informed.

The chairperson is responsible for forwarding to the group all questions regarding proposed changes in the procedures of collection and definitions. The changes can be raised from all organization. The progress of collection and quality issues is also taken up by the person.

The coordination group shall discuss and at best agree on these issues. The coordination group is also a forum for the participants to raise all problems with data and all improvement they want to suggest. This regards for instance adding new items, taking away old items, definitions and alternatives for items, quality issues, time lags, out data etc.

The group shall also be responsible for suggesting road safety problems that has to be analysed. Road safety research should be established. In many countries analysis is made at technical universities. The students do it as part of their education and the road safety organizations get analysis capacity free or at least at a very low cost. Some examples of research projects can be analysis of pedestrian accidents, and analysis of night time accidents. But also they are given a certain road, certain road segments, certain sites and asked to analyse crashes along this road and also to suggest improvement on the road and it environment. Another example is to analyse different types of junction design. Different types of road sections etc

Times for reporting crashes

There should be time limits to be met for the reporting. Such as limits for the time for reporting data to the database. This should be decided in the coordination group based on suggestions from the patrol

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police and the stakeholders. The suggestions can be like the following. It should be realistic goals and therefore be suggested by the patrol police that has the necessary resources.

- The first reporting into the data base within 3 days of the crash. With the on line reporting most crashes will be reported close to the crash but there will be cases when the reporting is delayed.
- Amendments within 40 days after the crash. (to allow for 30 days follow up of injured persons).
- The crash is closed for amendments after 45 days and no amendments can be done after that. This means that one year data is finished Febr. 15. Preliminary data will be issued earlier, within one week after year end.

It is not sufficient to wait for 40 days after the end of the month to report data for monitoring the road safety situation. Summarised data covering number of crashes, fatalities and injuries can be reported within one week of the end of month as preliminary numbers.

Other goals can be set on the reporting of accidents depending on severity etc. Fatal crashes shall be prioritized. Both regarding quality and regarding timing. Goals can be that a fatal crash shall be reported within 24 hours from the crash or when the person dies after the crash within 24 hours since the police got knowledge of the fatality.

Understanding the need of a crash database.

The feeling in the project is now that all stakeholders understand the benefits with a new system. There have not been any concerns raised on this issue during this visit. On the contrary, stakeholders seem to be eager to contribute to developing a new system and in the future to benefit from it.

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Current Crash Data base Procedures

The procedures today are shown in the picture below
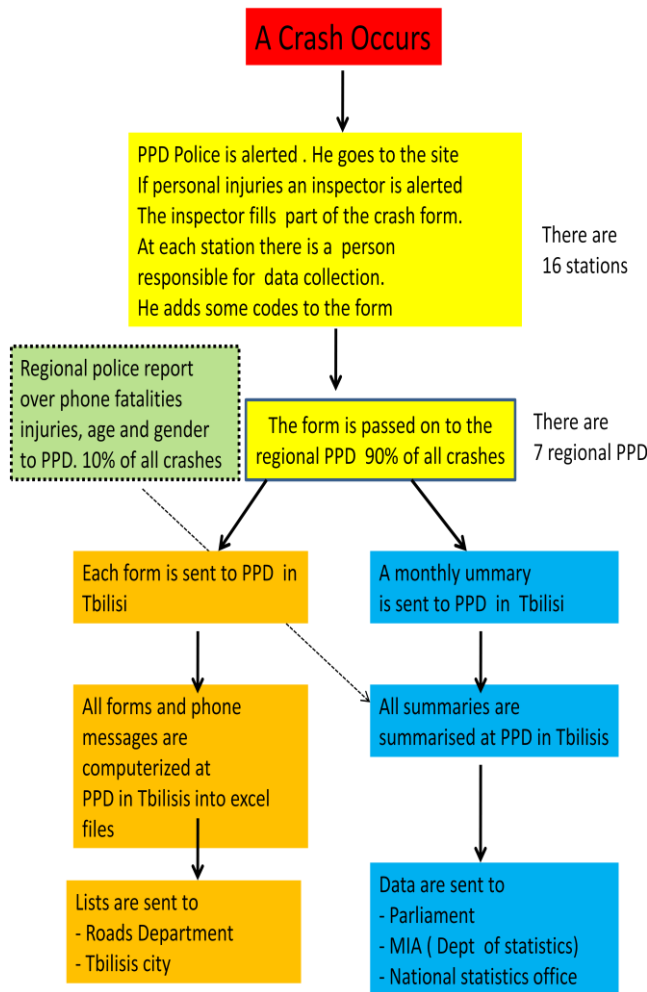
The Patrol Police Department is today storing data in 2 excel files.

Excel file 1 is containing data for each crash. An example of the content is shown below.
Nb Part of vehicle registration has in this copy been replaced with ??? to make the vehicles unidentifiable.

Road	km,m	acc caused by road	crash type	reason	fatalities	injuries	no of males	no of females	crash severity	vehicle numbers	
თხლღ	21,00		1	19		2	1	1	3	NAV-???	
მცხეთა-სტეფანწმინდა-ლარსი	17,00		7	19	2	2	4		2	ZEZ-???	PAD-???
თხლღ	23,00		1	1		1	1		3	GNG-???	ALE-???
მცხეთა-სტეფანწმინდა-ლარსი	3,00		1	19		2	2		3	TOO-???	SNO-???
მცხეთა-სტეფანწმინდა-ლარსი	61,00		1	19		2	2		3		
თხლღ	30,00		2	19		1	1		3	BOB-???	
მცხეთა-სტეფანწმინდა-ლარსი	110,00		3	2		1	1		3	AAI-???	
თხლღ	36,00		9	19		1	1		3	NYZ-???	
თხლღ	26,00		8	2		1	1		3	ZEZ-???	

Crash type is the present 9 types. The types are described below under accident types
Reason for crash is 19 alternatives.
Number of males is both fatal and injured. The same with number of females. So it is not possible from this file to see the number of killed males for instance. The excel file to be used for 2011 will be enlarged with this information and also with each persons age. Gender and age group is shown in excel file no 2 described below. The information is on a summary bases and can't be used to describe an individual crash.

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Crash severity is defined at the PPD with the following codes
1 fatalities only
2 fatalities and injuries
3 injuries only

Part of Excel file 1 is also transferred to Roads department for use in black spot work. The last 4 columns are not transferred. This file is a good basis for identification of accident prone kilometers if data from 3 years are consolidated. But location to kilometer is not enough when black spots shall be identified. Without a more detailed location the present system can't locate if there is a black spot in this kilometre or if the crashes are spread out on the kilometre.
So the location coding needs to be more detailed so that the reporting police writes hundreds of meters from the km. Or if he has possibilities to use GPS coordinates which of course is the best option.

For analysing black spots and for selecting countermeasures the present data is not enough. More detailed data is needed such as better accident types. The new form will solve that

Excel file 2 contains summary data. It is not possible to see in which crash a person is injured

The summaries are fed into the excel file at PPD in Tbilisi based on summaries reported from each of 7 PPD stations every month

Content of excel file 2 (X indicates that there are data in this group)

Table	Number of crashes	Number of fatalities	Number of injuries	Coverage
Reason of crash. (19 alternatives).	X	X	X	PPD jurisdiction
Crash type (9 alternatives).	X	X	X	PPD jurisdiction
Number	X	X	X	All areas
Urban – Rural	X	X	X	PPD jurisdiction
Age (6 groups)		X	X	PPD jurisdiction
Age (6 groups) Pedestrians only		X	X	PPD jurisdiction
Light conditions (3 groups)	X	X	X	PPD jurisdiction
Time (3 hour intervals)	X	X	X	PPD jurisdiction
Weekday	X	X	X	PPD jurisdiction
Numbers	X	X	X	Outside PPD jurisdiction
Car owners	X	X	X	PPD jurisdiction

Both files are stored on a monthly basis. Every month the summaries for the months during the year are calculated. These summaries are compared with corresponding summaries for previous year.

PPD in Tbilisi is doing a fantastic job with crash data and they have built up procedures to retrieve data based on requirements from the users. Their work will be much simplified with a new data base,

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since all out puts will be made from a new data base. All content in excel file 1 and excel file 2 are easily retrieved from a modern system.

There are many users that can utilize the data from the new data base once it is in use. Roads department and Tbilisi city (and other cities) need detailed information of the location and how each crash happened for their road safety work. Analysis department of MIA will use all data. Other users like Geo stat, ministry of labour, health and social affairs will use data on a more aggregate level.
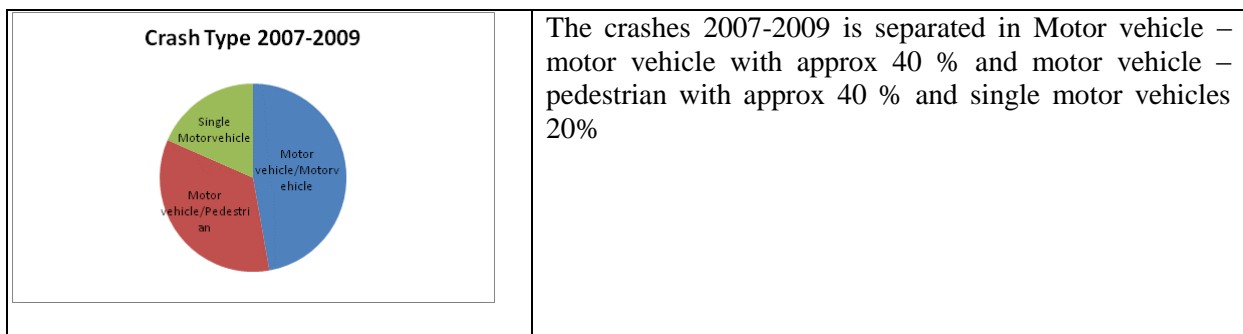
Review of Crash Report Form

The crash data form has been discussed in all 3 meetings with the coordination group. As a basis for discussion we have looked at forms in many European countries and many states in US. We have looked at 3 other proposals One proposal for European countries is CADaS - The Common Accident Data Set. Another proposal is called MMUCC guidelines. (Model Minimum Uniform Crash Criteria) for all States in the US. The third universal proposal is the WHO manual for crash data bases. It is of course not feasible to have all suggested variables included but they can be useful for discussions. The proposed form is shown in appendix 1. This form has been agreed in the coordination group.

Some important changes compared with the old form are described here

There are thick boxes for most alternatives in the new form except for comments. In the old form there were many open questions.

Accident types

Accident types (crash types) are a convenient way of describing and summarizing information about accidents.

Crash Type 2007-2009	The crashes 2007-2009 is separated in Motor vehicle – motor vehicle with approx 40 % and motor vehicle – pedestrian with approx 40 % and single motor vehicles 20%

Present types are proposed to be changed according to the table below. To make it easier for historical comparisons we try to keep as much as possible intact. The type collision involving truck is however suggested to be taken away. This is according to international practice since trucks can be detected from vehicle type. Trucks involved in single crashes or in collisions are reported in the same way as all other vehicles under vehicle type. Another change we propose is to separate collision into 3 groups depending on the directions of the involved vehicles. A fourth group will be proposed. It is collision (unspecified directions). This is in case the directions can't be stated. It is also a group where historical data can be stored after electronic transfer into the present system.
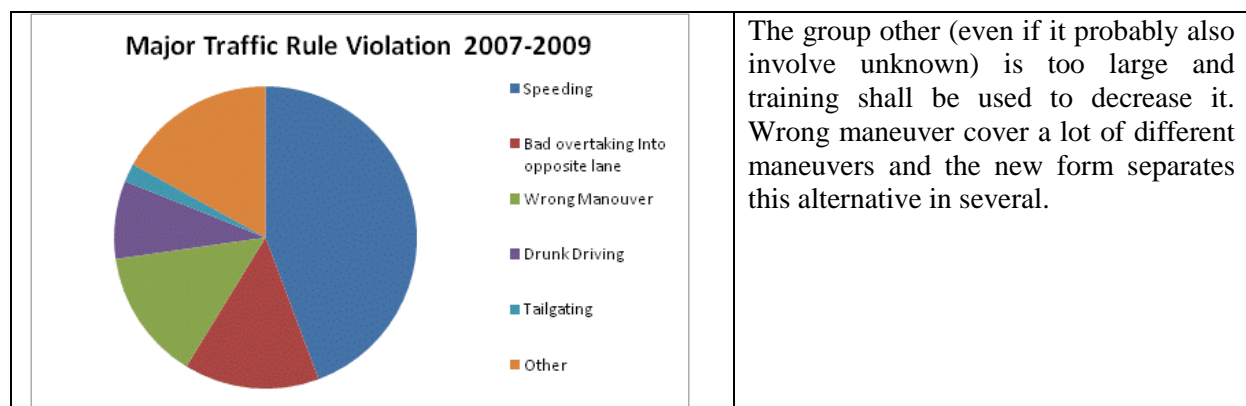
For improving the design and standard of roads it is also important to know the directions and movements of the vehicles before the impact.

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Present types	Proposed changes	New proposed
1 collision	Separated on 4	Collision is separated on: 1 From opposite directions 2 From same direction 3 From crossing directions 4 Collision unspecified directions
2 Overturning	No change	5 Single vehicle Overturning
3 parked vehicle	No change	6 Single vehicle collide with parked vehicle
4 obstacle	No change	7 Single vehicle collide with obstacle
5 Pedestrian	No change	8 Collision with pedestrian
6 Bicycle	No change	9 Collision with Bicycle
7 Truck	Deleted. Trucks involved are taken from vehicle type	10 Collision with animal
8 Animal	No change	11 Other types
9 Others	No change	

We have also discussed if we shall have sub types under accident types. It is decided not to have this since this is more complicated for the reporting person and we cover the necessary need of information by other items such as vehicle and pedestrian movements.

We also added an item: vehicle movement. Vehicle Movements will be analysed together with accident types to give a more complete picture. For pedestrians there is pedestrian movement.
Motor vehicle - motor vehicle will be separated in 3 different groups in the new form. This will make it easier to find the road safety problems and to select proper countermeasures. Pedestrians involved is also separated into 3 items for pedestrian movements and one alternative for violating of crossing law for pedestrian

The group other (even if it probably also involve unknown) is too large and training shall be used to decrease it. Wrong maneuver cover a lot of different maneuvers and the new form separates this alternative in several.

Linking Hospital Injury Data with Crash Data

There is no common database from hospitals for victims. International classification of deceases (ICD 10)is used in hospitals. In ICD 10 codes V01-V99 describe transport accidents. The codes separate pedestrians, bicyclists, motorcyclists, car occupants etc. It is not used by all hospitals today. This can be seen from the data we have received where the numbers are too few.

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There is a decree that defines that hospitals must cooperate with the police. This is done on a local level and gives the police knowledge about injured persons from traffic accidents. The police can also follow up injured persons to see if the patient survives or not.

In the specifications there is described how linkage to hospital data can be done.

Transfer of Historical data into a new data base

When a new data base is installed it is useful to transfer historical data into the data base. In this way the analysis can get a flying start without having to wait for years before the base is filled with enough crashes to make an analysis worthwhile.

Electronic transfer
It is only data in the present excel file 1 with individual data that can be electronically transferred into the new data base.

This means data on road name, location in km and (when available) m, accident type, cause of accident, number of fatalities and number of injuries.

For accident type and cause of accident it is necessary to create conversions from old alternatives to the new ones. This is however a computerized task.

Location has to be used in the GIS system. The GIS system at the roads department can calculate road distances and mark km on the maps. So technically it is possible to convert and display the old accidents that happened on roads with km posts into GIS systems. But the location of km posts has to be controlled on the road to make sure that the location is right. It is the km post on the road that the police use for locating the accidents and it is not at all sure that they reflect the real distances since roads are change without the km posts being changed.

To separate the old locations from the new it can be useful to have an item in the crash data base "Accuracy of location coding" This will be used also for the new data to indicate that the location is less reliable, for instance when the police have not had possibilities to visit the crash site.

Another old item has to be changed regarding the existing alternatives: It is accident type where one alternative is collision. In the new system this alternative is separated into 4. This can't be done with electronic transfer since the automatic transfer will give all crashes code 1 in present system) transferred to code 4: crash with unspecified directions.

This needs manual work. This however takes a lot of resources. The forms for all crashes marked as collision has to be manually checked. The crash sketch has to be studied to decide this. It may be necessary with a small pilot study to see if the sketches are detailed enough to make this possible and feasible.

Manual feeding in of data also has to be done for other items such as for instance age, gender.

Going through 3 years of data in this manual way is estimated to take 25 man months, or said in another way it takes 5 months for 5 persons.

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Plan for Implementation of a crash data system.

The plan for reporting and distribution of data is shown in the following figure
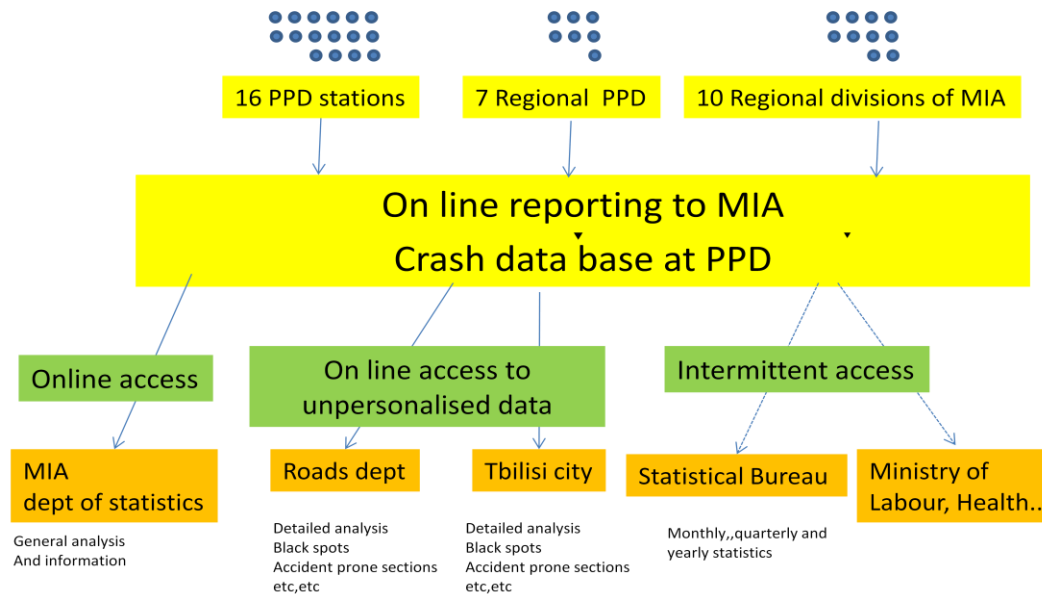
The reporting is done via computers on line. Mostly directly from the crash site using tablet PC's.. The actual number of soft ware installations is limited to 4. MIA, PPD, Roads Departmen and Tbilisi city. Intermittent access means that other stakeholders receive data over the internet at regular times.

Reporting units
Responsibility for all registered data in that area
Responsible for that all crashes are reported into the system from that area.
Has right to feed in data from any crash from that area. Has right to amend and change information on a crash that has been feed in from that area.
In each reporting unit there shall be one person appointed that has the overall responsibility for the data and its quality.

PPD
Overall responsibility for the data and the quality of data.
Has administrative right to decide and determine the rights of all users.
Has all right to feed in, amend and change any data. NB in practice PPD shall not change data. If they see that something is wrong or missing they shall notify the responsible unit so that they can change. This is a learning process for the persons that register. It is important that they get feedback when something is fed in wrongly so that they learn to improve.
The data base will be closed for entering new or changing existing crashes after a certain period. This can be done as a check in the database so that entry date or date for change can't be done later than 40 days after the crash.
There shall be 2 persons that work full time with the data base at PPD in Tbilisi.

Analytical units have the responsibility to inform PPD if they in their analysis work find missing or wrong data.

IT department have the technical responsibility for the data base and all technical connections.

Specifications for the crash data base to be bought/developed is shown in appendix 4

Design supply and installation of a road crash data base

Appendix 1 Form used for testing

Page 1

Accident Location				Accident Time		Crash DB Serial Number
Road / Location Name	Distance From Origin	GPS Coordinates	District	Date	Time	
		N				**Inspector / Investigator**
		E				

Crash Type
From opposite directions
From the same direction
From crossing directions
Direction unspecified
Single vehicle overturning
Collision with a parked car
Collision with an obstacle
Collision with a bicycle
Collision with a pedestrian
Collision with an animal
Other

Contributory Factors
Violation of traffic rules by driver
Vehicle defect
Passenger fault
Pedestrian fault
Road condition
Obstacles
Weather conditions
Missing trf. management items
Other

Sketch of the Crash

INVOLVED VEHICLES

Vehicle Number	Vehicle Type								Defects					Vehicle Movement										Id	
	Car	Lorry (less than 3,5 tons)	Lorry (more than 3,5 tons)	Minibus	Bus	Motorcycle	Other	Steering, front axle	Wheels, tyres	Windscreen	Defective light	Overloading	Straight Ahead	Turning Left	Turning Right	U-Turn	Overtaking	Changing Lane	Reversing	Standing Still	Stopping	Other	Unknown	Type (P,R,V,T)	Number	Brand / Model/Year of Production
1																										
2																										
3																										
4																										
5																										

Design supply and installation of a road crash data base

Page 2

INVOLVED PEOPLE

Person Number	Category				Sex			Injury				Seat Belt			Helmet			Alcohol				Violation of Traffic Rules by Traffic Participants														Pedestrian movement			Comments
	Passenger	Pedestrian	Driver	Vehicle Number	Male	Female	Age	Killed	Serious	Minor	None	Used	Not Used	Not Applicable	Used	Not Used	Not Applicable	Sober	Drunk	Was not possible	Drug Suspicion	Too high speed	Neglecting red light / stop	Did not give way	Ignore traffic sign/road marking	Careless overtaking	Sudden change of direction	Reversing Negligently	Tail-gating, keeping too close	Incorrect stopping / parking	Blinded by sun / oncoming vehicle	Did not keep to near side	Fatigued, sleepy, illness	Violation road crossing rule by pedestrian	Unidentified	Walking along the road	Crossing street outside pedestrian crossing	Crossing road at pedestrian crossing	
1																																							
2																																							
3																																							
4																																							
5																																							
6																																							
7																																							
8																																							
10																																							

Accident Environment and Road Condition

Road Number	Road Characteristics									Surface Type of Roadway				Surface Condition of Roadway					St. Lights		Trf. Signals					Junction Type	Climate Condition
	-- Straight road	C Curve	Il Bridge	= Road / rail crossing	Tunnel	Inclination %	Bitumen	Concrete	Gravel	Cobblestones	Earth	Good / fair	Damaged	1 Dry	2 Wet	Ice / snow	3 Dusty	On	Existing but off	Does not exist	Signal functioning	Signal yellow blinking	Signal off or broken	No signal		
																									O roundabout	Sunny
																									T junction	Rainy
1																									Y junction	Foggy
2																									+ junction	Stormy
3																										Snowy

Lighting	Surroundings
Daylight	Built-up area
Night	Not built-up area
Dawn	
Dusk	

Comments (please specify what traffic management elements are missing)

	Road Signs
	Road markings
	Road fence (guardrails, parapets)
	Directing arrangements (orientation piles, bollard lights, safety islands,)
	Speedbumps
	Other

Page 3

Involved People Details

	Identification					Driving Licence				Telephone	Address (country, city)
	Nationality	ID Number	Name	Surname		Driving Licence Number	Experience in Years	Driving licence category			
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											

Writing Description of Accident

SweRoad

Design supply and installation of a road crash data base

Appendix 2 "Off the shelf" suppliers of crash data bases

MAAP for windows (MAAP, Microcomputer Accident Analysis Package) The first version was developed in the mid 1980, before windows existed and before computers were on every desk.

It is manufactured by TRL Transport Research Laboratory in UK. MAAP has since its first introduction gone through many revisions. TRL is now preparing to make it web based.

MAAP can be provided in any language, and currently have English, Arabic, Greek, Turkish, Russian and Vietnamese versions

Website: http://www.trl.co.uk/software/software_products/maap.htm

STRADA Swedish Traffic Accident Data Acquisition

STRADA includes both hospital records and police records and linkage between the 2 modules. Modern maps are used for entering crashes and of course for analysis. This can be illustrated with the screen from the police reporting module.
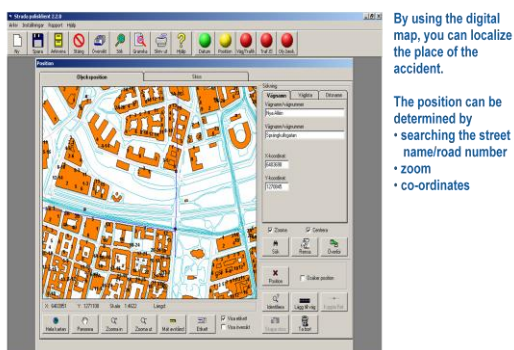
STRADA is tailor made for Swedish conditions and at present not available in other languages

RSMS

Road Safety Management System. A very competent system originally developed in a World Bank project in Kerala, India and later improved and now sold commercially. RSMS is installed in 1350 police stations in the Indian state Tamil Nadu.

In Sept 2009, IBS and TRL entered into a MoU (Memorandum of understanding) to develop technology solutions that can redefine the future of road transportation.
Website: http://www.ibsplc.com/road-safety-management-software.html

ViaStat
A Dutch system that is used in the Netherlands, parts of Belgium and Spain and the police in New Delhi and the state of Gujarat.
Website: http://www.irfnet.ch/files-upload/knowledges/Brochure_ViaStat_EN.pdf

AIMS
A system with GIS functionality
Website: http://www.jmwengineering.com/aims00/aims.html
Used in cities and counties in the United States and the city of Shanghai in China

Design supply and installation of a road crash data base

Appendix 3 Training plan

The following training needs are presented for handling the data flow.

Training course for all persons filling in the form. (one day).
    Proposed Content in training course:
    Describing handling of the system focused on in data.
    How to report from a site, especially sketches, location etc.
    Items, definitions and codes.
This shall be held when installing the crash data system.

Training course for all persons filling in the form. (one day).
This training course will be held about one month after the start of reporting and then repeated at 6 months intervals. The repetitions are based on the results of quality checks done. The training is directed at the items that seem to be difficult to record.
    Good and bad examples of filled forms will be displayed.

Training course for data responsible persons at each reporting unit. (one day).
Proposed Content in training course:
  Describing handling of the system focused on Computerization.
  Structure of the data base.
  Content in the data base.
  Automatic validation of data in the data base
  Items, definitions and codes.
  Who does what with entering into the data base.
This shall be held when installing of the system. Repeated every year

Use of data from the system (One day)
Proposed Content in training course:
  Describing handling of the system focused on analysis.
  Structure of the data base
  Content in the data base.
  Items, definitions and codes.
  Different out data
  Different analysis possibilities.
  Different tools for analysing.
To be held 6-12 months after start of the system. Repeated every second year

Using of data for black spot analysis (One day)
Participants shall have passed the training course for users of the system.
  Content in training course
  Use of data base for Identification of black spots and accident prone sections
  Use of data base for Analysis of identified black spots
To be held one year after the start of the system. Repeated every second year or when there are new persons working with black spots

Design supply and installation of a road crash data base

Appendix 4 Specifications of tools for location coding

This appendix is for information only since the newly installed computers at Patrol Police do already have GPS installed

For deciding locations the most developed tools are based on the American satellite systems GPS. So we will not talk about any other tools than those based on GPS.

It is estimated that 4 GPS devices will be used in each of 16 police stations. In total 70 including 6 for use in other places and for back up.

- It shall be possible to connect the GPS tool to a computer in each police station and import locations into the computer to minimize human errors when writing down the location codes.

- The Requirements on the GPS is that the device shall be easy to learn and to use and robust against shaking and dropping on the ground. It must be possible to use outdoor in all kinds of weather from -30 to +45 degrees centigrade and in rain and snow.

- The accuracy must be less than 20 meters in 99 % of all cases

- At least 200 location points must be possible to store in the GPS tool.

- The batteries shall last for at least 16 hours without recharging.

- Rechargers shall be included to every GPS. It shall be possible to recharge the batteries via police car batteries.

- The time to start (from "power on" until correct location is shown) must be less than 5 minutes.

- The manual must be in Georgian language

Design supply and installation of a road crash data base

Appendix 5 Specifications for a new crash data base.

General
The data base shall be in Georgian language. It shall be possible to switch between Georgian and English languages.

Web based access must be possible with open access to unidentified data by authorized stakeholder and others.

It shall be so simple to add new items or alternatives to present items to the data base so that it can be done by a person without programming knowledge

We use the word item in this description. Other names that are commonly used for the same is data field, variable or parameter. Examples of items are crash type, vehicle type, district.

Drop down menus shall be available.

The system shall keep record of who entered data and when. A record shall also be kept if data is changed or amended by whom and when. The number of reporting units is estimated to 33 and the number of users to 6. See main report.

There shall be possible to put minimum and maximum acceptable values for all items. Maximum and minimum acceptable values shall be possible to be set and to be change by a person without any computer programming knowledge.

Some examples:
1. Location shall be
North   between 41 degrees and 44 degrees
East   between 40 degrees and 47 degrees
2. Age is 0-120
3. Inclination % cannot be outside +/- 20.

There shall be possible to define that an item must always be filled in. This shall be possible to set and to be changed by a person without any computer programming knowledge.

Some examples:
1. Injury for each person
2. Violation of traffic rules for drivers and pedestrians

There shall be possible to cross validate two items to increase quality. This shall be possible to set and be changed by a person without any computer programming knowledge.

Some examples of cross validation:
1. If the "Road Characteristics" is either "Bridge" or "Tunnel" there cannot be more than one road specified.

2. If the crash type is specified as one of "From opposite directions", "Form the same direction", "From Crossing Directions", "Direction Unspecified", at least two vehicles must be specified.

Design supply and installation of a road crash data base

3. If the crash type is specified as one of "Single vehicle overturning", "Collision with an obstacle", "Collision with a bicycle", "Collision with a pedestrian", "Collision with an animal", one vehicle must be specified.

4. If the crash type is specified as "Collision with a pedestrian", at least one pedestrian must be specified.

5. Vehicle number "involved people" information must be specified. This number must correspond with the number of one of the vehicles entered previously. That is if there is only one vehicle specified the "vehicle number" in involved people can't be higher than 1

6. The district of the accident must be one of those that assigned to the data entry operator.

7. The vehicle number type and vehicle number must either both specified or none of the two. When specified the number can be validated by consulting the car registry systems of the Ministry of Internal Affairs. Type will be one of the followings:

   1- Georgian plate number

   2- Georgian transit plate or sticker number

   3- Foreign plate number (native or transit)

   4- VIN (Vehicle Identification Number)

   5- Technical passport number

   The type and the accompanying number can be passed to the Ministry of Interior's web services, which are capable of verification and retrieval of vehicle data. When specified the vehicle id type and vehicle id number couple must be verified. If the vehicle number cannot be verified by the "Vehicle Number Verification Use-Case" then the system must create an error record.

8. An inspector cannot create or modify a crash record with a killed person.

9. If the Georgian personal id number of a person is supplied in the crash database it can be checked by exchanging messages with the "Copy Civil Registry", which is maintained by the IT department of the Ministry of Internal affairs. If the personal id is specified as passport number, the id number will be checked by exchanging messages with "Border Crossing System", which is also maintained by the IT department of Ministry of Internal Affairs. In either case, the nationality field cannot be skipped. If the supplied identity number is not verified by the "Personal Id Verification Use-Case" then the system must create an error record.

10. When the system is capable of recording "Criminal Case Identifiers" (CCI) which must be verified when supplied. The CCI cannot be supplied by an inspector. The external system to be consulted is the "Criminal Case Recording System" being hosted by the Ministry of Justice. If the CCI cannot be verified by the "CCI Verification Use-Case" then the system must create an error record.

11. When an IFJ is associated with a person entry involved in a crash record, the inconsistencies on followings are eliminated.

   1- Injury data (dead, serious injury, minor injury)

   2- Id and name of the person

Design supply and installation of a road crash data base

Pre defined and user defined out puts

There shall be possible to have pre defined selection criteria and cross tables for the most frequent uses. There shall be possible to create and save user defined selection criteria and cross tables.

Possibility to have pre defined document with data (raw data, selections etc)
Possibility to have user defined documents with data (raw data, selections, evaluation over time) for distribution to other stakeholders. For instance covering monthly reports, yearly reports.

There shall be possible to produce alarm reports. The user shall state a level when the alarm is triggered.

For all outputs the date and time shall be stated. For output based on selections or tabulations the criteria for selection or tabulation shall be stated on each output together with date and time for selection.

Selections and tabulations

Any combination of items in the data base shall be available for selection or cross tabulation. The results of selections or cross tabulations shall be possible to save in formats so that further selections or cross tabulations can be done on the crashes.

Possible with selection of routes, sections or sites for analysis.
Selected routes, sections or sites shall be possible to rank according to the number of crashes or weighted number of crashes. The weights shall be fed in by the user and applied on crash severity.

Warnings on possible errors when making selections or tabulations shall be stated. There can be a warning for items that have changed definition or alternative. There can be a warning if items or crashes are not collected during the whole selected period etc.

Comparisons of one selection (sites, areas, period) against other selections of the same dimension (sites, areas, period) or against the whole database.
The items that shall be used for this kind of comparison shall be selected from the item lists.
Some of the more interesting items are crash severity, crash type, lighting, violation of traffic rules, surface conditions.

There shall be possible to produce alarm reports. The user shall state a level when the alarm is triggered.

Possibility to produce predefined reports for information on the road safety situation. For instance reports describing the monthly, quarterly and yearly situation and the changes compared with previous periods. Also the information needed by the Statistical bureau shall be produced automatically.

Possibility to produce item matrixes (stick diagrams) of selected crashes. Selection of crashes done from criteria or from geographical selection on a map. Selection of items shall be possible from all items.

Design supply and installation of a road crash data base

Collision diagrams
The data base shall have possibilities to generate collision diagrams. With this is meant an automatic generation of involved vehicles movements in a crash. This is mostly used in junctions.
The proposed crash form does not include items for this. The reason is that it is a difficult to fill in correct orientation and same orientation for all crashes. Experience shows that it will create a lot of supervision to ensure the quality of the reporting. We want to get the reporting started but to have possibilities that later enlarge it. Filling in orientations and movements according to this needs more training and possibly also sketches at the police stations for each junction describing leg 1,2,3, etc to be consulted to get the directions correct. But having prepared the data base for this makes it possible to use the sketches on the crash form and feed in directions in this way and in the future add this item onto the form

Sketches on the report form shall be possible to scan into the data base and possible to retrieve. For instance all sketches for crashes in one selected site or area.

Storage of additional data and files
Possible to store photos, sketches, videos of the crash and its location. Possible to store pictures downloaded from internet describing the crash site. For instance zoomed pictures over junctions downloaded from Google earth.

Data export
There shall be export facilities to other programs for instance analysis programs such as excel, access, SPSS and SAS.
There shall be Export facilities to word and pdf files

Mapping
It shall be possible to see location on maps when entering data.
All individual crashes shall be displayed on the maps.
Clicking on an individual crash on the map shall show items for that crash.
It shall be possible to select a symbol/color for crashes based on crash type for display on the map. It shall also be possible to select a symbol/color for crashes based on crash severity for display on the map. It is an advantage that this symbol/color feature is applicable for any item selected
Several sites, or areas can be selected at the same time. The number of crashes in each site, polygon or area shall be shown with symbols with size proportional to the number of crashes

Selection of areas (polygons, circles, districts etc) and displaying crashes in these areas shall be possible. Several sites, or areas can be selected at the same time. The number of crashes in each site, polygon or area shall be shown with symbols with size proportional to the number of crashes

Multiple selection of areas or sites from the map for instance for sites where the same countermeasures have been installed.

Possibilities to show individual data such as stick diagrams over crashes in selected areas.
Possibilities to show diagrams or pie charts over selected crashes.

Design supply and installation of a road crash data base

It shall be possible to display only crashes that fulfill certain criteria. For instance certain crash types, night time crashes only, wet surface crashes only.

Crash density maps shall be possible to produce

The current map scale shall be visible.

The data base shall be possible to link with the GIS systems used by roads department for use together with road data.

Integration with Other Data

In this report is described possible integrations with other data.

The most important is to integrate hospital records and to coroners reports.
This linkage can grossly increase the quality of the data base.

Next in importance come possibilities to analyse crash data together with road geometry data and traffic data

Linkage to driver registers and vehicle registers is the next priority.
Drivers registers to analyse the correspondence between age of license and crashes. Vehicle data for instance since heavy vehicles (>3.5 tons) is such a heterogenic group. the link to the vehicle register is thus important for heavy vehicles. It can be of special importance to have information on vehicles like tankers when dealing with the issue of dangerous goods.

Other linkages that can be useful for specific purposes are:
Police enforcement data
Vehicle inspection data
Violation and conviction data
Population data

Crash Database Use-Cases and Functional Design

Functional Components

The crash database tailored for Georgian needs have four main functional components as listed below.

- *Crash data collection*

   The crash data collection function implements the logical data design of the crash database with the consistency requirements as stated in the functional specification. The logical data design enables the system to represent the data coming from the crash data forms, the injury/fatality journals, and some other application specific sources. As being at the focal point of the design, the crash data form holds critical data that serve for purposes of statistical analyses, case investigations and prosecutions, and justification of the insurance claims. The crash data will cover mainly time, location, environmental conditions, road conditions, vehicles, and people of the accident. Additional data on injury details and fatalities coming from the hospital are also managed by the crash data collection. This function ensures the data represented in the best possible way at the most possible consistency level.

Design supply and installation of a road crash data base

The crash data collection function has the capability of receiving data from the offices of the inspectors or the investigators via the network connections supplied by the IT services of the Ministry of Internal Affairs. Hospitals, as another source of the data, are enabled to post data about injured or dead people which can be associated with the people involved in the accidents. The crash data collection supports alternative methods to receive data from the hospitals so that the hospital management can choose and develop the most applicable way based on financial, technical and procedural constraints.

- *Integration and external validation services*

The crash database is in touch with the external systems for both validating crash data and presenting data. Keeping in mind that high quality statistics is possible with high quality data, and supporting state of the art industrial connectivity standards, the crash database performs the checks on people and vehicles by interacting with the external source systems hosted by the IT department of the Ministry of Internal Affairs. The functional specification requires use of key values like citizenship numbers and passport numbers that can be used as parameters to the messaging that will occur between the crash database and "the civil registry" and "the border crossing system". It should be noted here that, the IT department of the Ministry of Internal Affairs is operating the copy database of "the civil registry" which is operated originally by the Ministry of Justice. The integration services will be used also for validating the vehicle identifiers with support of "the vehicle registry system" and "the transit vehicle registry system", which are being operated by the IT department of Ministry of Internal Affairs.

Apart from the validation purposes, the crash database is designed for being used in integration with the geographical information systems. It is possible to make the crash data parameters stored in the crash database available to the GIS system being used by the Roads Department. The GIS system of concern is capable of making a connection to the external databases, importing data from the set of available views, and marking the locations on the map with associated data of interest.

The integration and external validation function is capable of making massive use of technologies like ODBC, JDBC, and native data libraries at data connectivity level, web services at the application level. It is a known fact that, in order to make this function working well, network connectivity requirements covering those like Virtual Private Networks can be supplied by the IT department of the Ministry of Internal Affairs.

- *Crash reporting*

Crash reporting component makes it possible to create wide variety of reports by means of an integrated report generator. The report generator makes all of the crash parameters available via the views for reporting purposes. The design enables the user to create reports by using all possible combinations of the crash parameters, which can be interpreted as statistical variables from the statistical point of view. In this respect, combining data about time, location, environmental conditions, road conditions, vehicles, and people are possible. The tables and the lists are created interactively by using the tools made available on the web pages by the reporting component. In order not to force the system user to create the desired table or list from scratch, the system required to store a set of pre-defined reporting objects, which can be navigated by following a classification scheme. Both the content of the object and the navigation tree can be developed by the privileged system users by making use of the crash database application without needing additional programming efforts that possibly result in redeployment of the system.

- *Access control and configuration parameter management*

The Crash Data base will respond to its users through comprehensive access control. None of the responses will be generated without provision of access control.

Design supply and installation of a road crash data base

The crash database is accessible by the users having the following possible roles each was designated to perform specific tasks.

The inspectors
An inspector can create an electronic crash data form to feed the system the crash data without fatalities and heavy injuries. The inspector can update or delete that was entered by her/him. The updates and deletions are not possible if a reviewer marks the crash data form as "finalized" electronically.

The investigators
For the accidents with fatalities or that require hospital follow-ups, the investigator role is authorized to enter the crash data form to the system. The investigator can update or delete that was entered by her/him. The updates and deletions are not possible if a reviewer marks the crash data form as "finalized" electronically. The investigator also authorized to enter data coming from the hospitals. They also have the responsibility of tracking and processing the injury / fatality journals posted by the hospitals.

The crash data reviewers
The crash data reviewer role defines the authorization to "close the case" by marking the relevant crash record as "finalized". The role can also "open the case" by marking it as "opened temporarily". The crash data collection function tracks the open cases and reports them to the reviewers in order to prevent to keep the cases open more than necessary. They also have the responsibility of tracking and processing the injury / fatality journals posted by the hospitals.

The crash data viewers
This role is for those who are in need of finding, viewing, and printing only. This role has no authority to make changes on the crash records.

The hospital users
The hospital users are authorized to post detailed injury and fatality journals to the crash database. The investigators and the reviewers use the crash recording functions to relate these data with the crash data forms.

The statistics users
The statistics users are entitled to use the crash reporting function. They can use existing ones or create new ones.

The GIS users
The GIS users connect to the views of the crash database to fetch data that will be represented on the GIS system.

The system administrators
The system administrators can create, delete, or modify user accounts. They can assign or revoke the user roles.They have the overall responsibility for the content in the crash database..

Crash Database Use-Cases

A crash database use-case in this section is a short term process that describes an interaction session that occurs between the user and the information system to achieve a specific task. In each use-case description, the roles having the authority to use, the steps to achieve the task, and the results that should be expected are given. It should be noted here that the steps that will be followed by the user can be abandoned or cancelled at any stage even if the use-case does not specify explicitly that it is possible to do so.

Design supply and installation of a road crash data base

UC 1.   Finding a crash record

Goal: To specify a crash record.

Roles allowed:

✓	System administrators
	GIS users
	Statistics users
	Hospital users
✓	Crash data viewers
✓	Crash data reviewers
✓	Investigators
✓	Inspectors

Description:

The aim of this use-case is to spot a crash record by performing a search in the crash database by matching the recorded crash parameters with the values supplied by the user. The crash database contains the screen elements to receive the search parameters that will be used in the searching process. The result of the search process is the record set where each record is represented on the screen as a single line. The result set presented on the screen is an interactive one which is capable of sorting with a single click on one of the column headers. Finding a crash record is a use case that precedes the use-cases that operate on a single crash record such as viewing, printing, updating and deleting.

Steps:
1. The user is presented the search parameter window.

2. The user fills out the search parameters.

3. The user starts the search by using search command button / link.

4. The system performs the search based on the parameters supplied and creates a result set.

5. The system presents the result by a window that contains an interactive table. The number of the records and the page number in the record set are visible for user's convenience. The table should present only a predefined number of crash records to prevent overwhelmingly long lists. The list items convey the crash DB number, location of the crash, date of the crash, and the operator who created the crash record.

6. The user can choose to click a column header to perform a sort based on the fields being presented. This interaction takes the use case to the step 4. Or, when possible, the user can click on a link to view another page of result records. This interaction keeps the user at the step 5. Or, the user clicks on a crash record, which ends the process of spotting the crash record. From this point on, the system can continue with operating on the chosen crash record.

Notes:
1. This use-case is designed for being invoked from other use-cases.

2. The search parameters are as follows and at least one should be specified.

   Keywords: This field specifies the keywords that will be searched in the crash database. The keyword will be searched in crash serial number, road/location name, district name, name and surname of people in the crash record, brand and model of the vehicle, personal id number which can be citizenship number or passport number, vehicle id number which can be plate number, technical passport number, or transit plate number, telephone and address. There are

Design supply and installation of a road crash data base

two additional options that accompany the keyword parameters: "whole word search" and "phrase Search". If the "whole word search" is checked the keywords must exist exactly in the crash parameters for a matching record. If this option is unchecked, it is sufficient for a word occurring in the crash parameter to cover the keyword to be qualified as a match. If the "phrase search is checked", the search algorithm should not parse the keywords parameter into words. It should be noted here that the effect of the "whole word search" is independent of the "phrase search".

Date or date interval: When specified, only the accidents occurred on given date or within the time interval will be viewed.

3. The search parameter window will contain a detailed search button that expands the following list of items each of which has a checkbox across.

  o Crash serial number

  o Person name and surname

  o Road-location name

  o District name

  o Brand and model

  o Personal id number

  o Vehicle id number

  o Telephone

  o Address

By using the checkboxes the user can narrow the scope of the keyword search. It should be kept in mind that if a keyword is specified, at least one of the above items must be checked. By default, the crash database assumes all of the items are checked.

4. A row in a result set table contains the columns having list item ordinal number, crash DB serial number of the accident, date of the accident, the road-location name, the district name, person names separated with comma, addresses with eliminated new-line characters and separated with semicolon, plate numbers (or available vehicle id numbers) separated by comma. Sorting is possible on following columns: the crash DV serial number, the date of the accident, the road-location name, and the district name.

5. Not all of the items result set will be allowed for further details like viewing, printing, deleting or updating. For those records, a different visibility like graying will be applied.

An investigator or inspector can process only the data entered by him / her. A crash data viewer and a crash data reviewer can view only the crash data happened within the region of responsibility.

UC 2.   Viewing a crash record

Goal: To view a crash record on screen.

Roles allowed:

✓	System administrators
	GIS users
	Statistics users
	Hospital users
✓	Crash data viewers

Design supply and installation of a road crash data base

✓	Crash data reviewers
✓	Investigators
✓	Inspectors

Description:

Viewing a crash record starts with finding the intended crash record. The lines in the result list table are sensitive to clicking which takes the user to the crash record viewer window where detailed crash parameters can be seen and navigated. The crash record viewer shows all of the crash data parameters that were registered. In addition to those, the record viewer creates additional data that can be derived from the details for convenience of the user. An example to such kind of data is the severity of the accident. In practice there are four possible levels of severity: Fatalities, serious injuries, minor injuries, damages only. The severity that is reported in the viewer is function of the data captured in people section. Another example is the summary information about the fatalities or injuries given for the accident. A very small report on numbers of dead people, severely injured people, and people with minor injuries will be informative.

Steps:

1. The user follows the steps as explained in "Finding a crash record".

2. The system prepares the windows containing the crash record that was selected by the user. The system also locks the crash record to prevent others to operate on it. In case the locking fails, the system informs the user accordingly and stops at this step.

3. The user navigates the crash data details using the user interface elements as required.

4. The user ends viewing by choosing "quit" link. The system releases the lock on this crash record.

Notes:

1. There will be no crash parameter left hidden in the viewer windows.

2. An investigator or inspector can view only the data entered by him / her. The crash data viewer and the crash data reviewer can view only the crash data happened within the region of responsibility.

UC 3.   Printing a crash record

Goal: To print a crash record after viewing.

Roles allowed:

✓	System administrators
	GIS users
	Statistics users
	Hospital users
✓	Crash data viewers
✓	Crash data reviewers
✓	Investigators
✓	Inspectors

Description:

For some occasions, printed copy of the crash record may be required. A highly readable and neat output may help the officials or individuals in businesses like prosecution or insurance claims. If the printing gets stamped by the relevant authority, it can be used as official evidence.

Steps:

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1. The user follows the steps as explained in "Finding a crash record".

2. The system prepares the windows containing the crash record that was selected by the user. The system also locks the crash record to prevent others to operate on it. In case the locking fails, the system informs the user accordingly and stops at this step.

3. The user navigates the crash data details using the user interface elements as required.

4. Clicking on the "Print" button on the viewer screen, the user requests a print-out.

5. The system prepares and posts the file content in an industry standard format such as PDF.

6. The user sends the received material to the printer as appropriate.

7. The user selects the "quit" link. The system releases the lock on the crash record.

Notes:
1. There will be no crash parameter unprinted.

2. An investigator or inspector can print only the data entered by him / her. The crash data viewer and the crash data reviewer can view only the crash data happened within the region of responsibility.

3. In addition to the crash data parameters, the print-out contains following items.

   - The date and the time of the print-out.

   - Name, surname, personnel number of the operator who generated the output.

   - A legend of symbols or coding to make the print-out self explanatory.

   - Any legal notice like disclaimers, confidentiality and so forth.

UC 4.   Crash record entry

Goal: To create a crash record based on data coming from crash data form.

Roles allowed:

✓	System administrators
	GIS users
	Statistics users
	Hospital users
	Crash data viewers
	Crash data reviewers
✓	Investigators
✓	Inspectors

Description:

This is the act of entering data contained in the crash data form into the system by using the interactive page elements of the crash database application. Appropriately designed user interface elements like drop-down lists, date-time pickers, list boxes, checkboxes, and similar help the user enter the information accurately. It is also possible to upload any relevant files like photographs, scanned documents, and similar.

Steps:
1. The user requests creation of a new crash record by specifying location data, date and time. The location should contain the district, the road, the offset, the GPS coordinates.

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2. The system checks the data entered and creates the crash record by establishing a lock on this record. The system replies with the crash record editing root page, where the user have chance to enter data regarding the "Accident Environment and Road Conditions", "Traffic Management Elements", "Crash Type", "Vehicle Details", and "People Details".

3. The user notes the crash DB serial number on the crash data form by using the information that appears on the page generated at step 2.

4. The user interacts with the relevant pages until depositing all the information conveyed by the crash data form.

5. The user chooses "record and quit" button before leaving the last page he or she worked in order to make sure that the data is recorded in the crash database. The system releases the lock on this crash record.

Notes:

1. The data entry operators, in this case the investigators and the inspectors, are allowed to enter data pertaining to only the regions for which they are authorized.

2. The other use-cases for on-line verification of some fields will also be used while performing Step 4. These are:

   a. CCI (Criminal Case Identifier) verification

   b. Vehicle number verification

   c. Personal id verification

3. The crash database application creates log for creation of the crash record. The log contains at least the date and the time of the record creation, the user identifier who created the record, and the crash DB serial number.

4. It should be noted that the crash DB serial number is not for counting purposes. The number is only for identifying the accident uniquely. The system is capable of generating counts of the accidents for time intervals through its reporting functions.

5. The crash database application creates and maintains the set of error/warning records for each of the crash records which can be viewed later. The system recreates this set each and every time the user updates the crash record. This helps the reviewers and the data entry operators to track the crash records with respect to their problems. The strategy of not recording the problematic records is not acceptable as it creates additional overhead of managing problematic crash data forms without help of the information system. The errors/warnings can be due to inconsistencies, conflicts, and missing information which are governed by the rules that can be found section of "criteria of correctness". Note that, the application can perform additional tests, too.

UC 5.   Crash record update

Goal: To update an existing crash record after finding it.

Roles allowed:

✓	System administrators
	GIS users
	Statistics users
	Hospital users
	Crash data viewers
✓	Crash data reviewers

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| ✓ | Investigators |
| ✓ | Inspectors |

Description:

The crash record update use-case is required to make changes on an existing crash data record. There can be several reasons to update the record like correction of detected or undetected errors, updates based on hospital data, completion of missing data, and so on. For investigators and the inspectors, this use-case cannot be applied on "closed" crash records. If the crash record is closed previously by the "Case Closure", it should be reopened by the reviewer or the system administrator applying "Temporary case opening".

Steps:

1. The user follows the steps as explained in "Finding a crash record".

2. After user selects the intended record the system displays the crash record editing pages that allow the user to make changes as appropriate. The system also locks the crash record to prevent others to access the crash record.

3. The user chooses "record and quit" button before leaving the last page he or she worked in order to make sure that the data is recorded in the crash database. The system removes the lock that has been established on the crash record.

Notes:

1. The data entry operators, in this case the investigators and the inspectors, are allowed to modify data pertaining to only the regions for which they are authorized.

2. The other use-cases for on-line verification of some fields will also be used while performing Step 2. These are:

    a. CCI (Criminal Case Identifier) verification

    b. Vehicle number verification

    c. Personal id verification

3. The crash database application creates log for update of the crash record. The log contains at least the date and the time of the record creation, the user identifier who updated the record, and the crash DB serial number.

4. The crash database application creates and maintains the set of error/warning records for each of the crash records which can be viewed later. The system recreates this set each and every time the user updates the crash record. This helps the reviewers and the data entry operators to track the crash records with respect to their problems. The strategy of not recording the problematic records is not acceptable as it creates additional overhead of managing problematic crash data forms without help of the information system. The errors/warnings can be due to inconsistencies, conflicts, and missing information which are governed by the rules that can be found section of "criteria of correctness". Note that, the application can perform additional tests, too.

UC 6.   Crash record deletion

Goal: To delete an existing crash record.

Roles allowed:

| ✓ | System administrators |

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	GIS users
	Statistics users
	Hospital users
	Crash data viewers
✓	Crash data reviewers
✓	Investigators
✓	Inspectors

Description:

Crash record deletion is allowed only for the extreme case that the crash record is absolutely wrong or unnecessary. The crash record deletion is done after receiving confirmation from the system administrators. For investigators and the inspectors, this use-case cannot be applied on "closed" crash records. This use-case is not applicable by them even when the case is reopened temporarily. For the reviewers and the system administrators these restrictions do not apply. The deletion does never occur as deletion of records in the database. Instead, the crash database marks the accident as "deleted". Deleted records are excluded from the record sets for finding. These records must be excluded from the statistical reports, too.

Steps:

1. The user follows the steps as explained in "Finding a crash record".

2. The system prepares the windows containing the crash record that was selected by the user. The system also locks the crash record to prevent others to operate on it. In case the locking fails, the system informs the user accordingly and stops at this step.

3. The user navigates the crash data details using the user interface elements as required.

4. Clicking on the "Delete" button on the viewer screen, the user requests deletion.

5. The system creates a page with warning.

6. The user either indicates that he or she is sure to proceed or declines. The system always creates a page presenting either the result of the deletion or a message indicating that the deletion has been cancelled upon user's request.

7. The system removes the locks established for this crash record.

Notes:

1. An investigator or inspector can delete only the data entered by him / her. The crash data viewer and the crash data reviewer can delete only the crash data happened within the region of responsibility.

2. The crash database application creates log for deletion of the crash record. The log contains at least the date and the time of the record creation, the user identifier who deleted the record, and the crash DB serial number.

UC 7.   Crash record recovery

Goal: To restore an accidentally deleted crash record.

Roles allowed:

✓	System administrators
	GIS users

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	Statistics users
	Hospital users
	Crash data viewers
✓	Crash data reviewers
✓	Investigators
✓	Inspectors

Description:

Crash record recovery is an exceptional use-case that can be used only by the reviewers and the system administrator to restore a previously deleted crash record. Applying this use-case is at discretion of the allowed users.

Steps:
1. The user follows opens the page "case recovery".

2. The system replies with the filter screen asking the date interval.

3. The user fills in the parameters and proceeds with choosing the appropriate link.

4. The system presents the result by a window that contains an interactive table. The number of the records and the page number in the record set are visible for user's convenience. The table should present only a predefined number of crash records to prevent overwhelmingly long lists. The list items convey the crash DB number, location of the crash, date of the crash, and the operator who created the crash record.

5. The user can choose to click a column header to perform a sort based on the fields being presented. This interaction takes the use case to the step 4. Or, when possible, the user can click on a link to view another page of result records. This interaction keeps the user at the step 5. Or, the user clicks on a crash record to proceed to the step 6.

6. The system creates a warning message to make sure that the user really wants the recovery.

7. The user indicates either that he or she is sure to proceed or declines.

8. The system always creates a page presenting either the result of the deletion or a message indicating that the deletion has been cancelled upon user's request.

Notes:
1. The crash database application creates log for recovery of the crash record. The log contains at least the date and the time of the record creation, the user identifier who recovered the record, and the crash DB serial number.

UC 8.   Automatic unlocking

Goal: To release the crash records that has been put on hold by the users.

Roles allowed:

✓	System administrators
	GIS users
	Statistics users
	Hospital users
	Crash data viewers
	Crash data reviewers
	Investigators
	Inspectors

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Description:

This use-case is not started by a human-machine interaction. A background process working with the system-administrator's personality performs the steps at the end of every interval having the length (typically 20 minutes) as specified by the crash database configuration. Automatic unlocking is vital for the users who close the crash view page mistakenly or obliviously before quitting by explicitly choosing the relevant user interface element. In such cases, the crash record will be left locked forever preventing other users to access it.

Steps:
1. The system walks through the locks and deletes each expired.

UC 9. Posting injury / fatality journal

Goal: To record injury / fatality journals mainly from the hospitals.

Roles allowed:

✓	System administrators
	GIS users
	Statistics users
✓	Hospital users
	Crash data viewers
	Crash data reviewers
✓	Investigators
	Inspectors

Description:

This use-case is for the users who post injury / fatality journal (IFJ) that will be matched with the people who involved in the accident. The crash database stores these journals to make them available for the investigators and the reviewers who will bind the journals with the crash records later by using the "Matching injury / fatality journals with crash data" use-case.

Steps:
1. The hospital user requests the system to show the injury / fatality pages by specifying the journal number that is unique to identify the case within the hospital and the year.

2. The system responds with the pages with data if such a journal was recorded before. Otherwise the blank IFJ page is displayed.

3. The user interacts with the user interface elements to enter the data contained in the injury / fatality pages.

4. The user chooses "record" link to finalize entering data.

Notes:
1. A hospital user can enter only data pertaining to the hospital for which he or she is working for. For these users, there is no need to specify the hospital explicitly.

2. For an investigator, the hospital can be only one of those registered in the responsibility region of the investigator.

3. The crash database application creates log for registration of the IFJ. The log contains at least the date and the time of the record creation, the user identifier who created or updated the IFJ, and the crash DB serial number if applicable.

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4. The IFJ register each injury of a person in "body-part"/ "injury level" pairs. The crash database IFJ pages contain a useful user interface element (user-control) enabling to user to select level of injury and marking the injury on body illustration as depicted in the IFJ pages.

5. This user case depends on possibilities to access hospital data

UC 10.   Revocation of injury / fatality journal

Goal: To allow the users to drop a previously entered injury / fatality journal.

Roles allowed:

✓	System administrators
	GIS users
	Statistics users
✓	Hospital users
	Crash data viewers
	Crash data reviewers
✓	Investigators
	Inspectors

Description:

Revocation of an IFJ is possible only when the IFJ is free. An IFJ can be deleted from the system (revoked) in rare cases where the IFJ was created by mistake. A hospital or an investigator user can revoke the IFJ if and only if the IFJ is free and the IFJ was created by him / her. There is no such limitation for the system administrators.

Steps:
1. The hospital user requests the system to show the injury / fatality revocation pages.

2. The system responds with a parameter window where search parameters for the IFJ can be specified. Following search parameters are available.

    The hospital: This parameter can be used to narrow the search list. For the hospital users this parameter cannot be specified because the hospital is known implicitly.
    The hospital journal number: This is the journal entry identifier of the case for the person. When combined with the hospital journal number, this field is supposed to form a unique identifier within year.
    Date interval: This parameter can be used to narrow the search list.
    Name of person: This parameter can be used to narrow the search list.
    Surname of person: This parameter can be used to narrow the search list.
3. The system presents the result by a window that contains an interactive table. The number of the records and the page number in the record set are visible for user's convenience. The table should present only a predefined number of IFJs to prevent overwhelmingly long lists. The list items convey name of the hospital, journal number, name of person, nationality of the person, personal id or passport number of person and status of the person as killed, seriously injured or slightly injured.

4. The user can choose to click a column header to perform a sort based on the fields being presented. This interaction takes the use case to the step 2. Or, when possible, the user can click on a link to view another page of result records. This interaction keeps the user at the step 4. Or, the user clicks on a crash record to proceed to the step 5.

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5. The system presents user a final confirmation page with details about the IFJ being revoked. At this point the user can choose to proceed with revocation or decline.

6. The system always creates a page presenting either the result of the deletion or a message indicating that the deletion has been cancelled upon user's request.

Notes:
1. A bound IFJ cannot be revoked.

2. The crash database application creates log for revocation of the IFJ. The log contains at least the date and the time of the record revocation, the user identifier who created or updated the IFJ, the hospital and the hospital journal number.

3. This user case depends on possibilities to access hospital data

UC 11. Matching injury / fatality journals with crash data

Goal: To associate a injury / fatality journal with a person involved in a crash.

Roles allowed:

✓	System administrators
	GIS users
	Statistics users
	Hospital users
	Crash data viewers
✓	Crash data reviewers
✓	Investigators
	Inspectors

Description:

This is the specific activity of assigning a free injury / fatality journal (IFJ) to a crash record. A "free IFJ" is an IFJ that has not been assigned to a specific crash record. When the IFJ record is assigned to a specific crash record, it becomes a "bound IFJ".

Steps:
1. The user requests the list of free IFJs from the system. While requesting, the user can set a date interval and hospital to limit the list of the items.

2. The system presents the result by a window that contains an interactive table. The number of the records and the page number in the record set are visible for user's convenience. The table should present only a predefined number of IFJs to prevent overwhelmingly long lists. The list items convey name of the hospital, journal number, name of person, nationality of the person, personal id or passport number of person and status of the person as killed, seriously injured or slightly injured.

3. The user can choose to click a column header to perform a sort based on the fields being presented. This interaction takes the use case to the step 2. Or, when possible, the user can click on a link to view another page of result records. This interaction keeps the user at the step 3. Or, the user clicks on a crash record to proceed to the step 4.

4. The system presents another query form for preparation of the list of possible crash records that can be associated with the IFJ. The query page contains following parameters:

    The crash DB number: If the information available, this is the safest parameter to supply.
    The name of the person: This can be used for reducing the number of records that will be created in next step.

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> **The surname of the person:** This can be used for reducing the number of records that will be created in next step.
> **Date interval:** This can be used for reducing the number of records that will be created in next step.
> The user supplies the parameters as appropriate and submits another request to create the list of the possible accidents this time.

5. The system presents the result by a window that contains an interactive table. The number of the records and the page number in the record set are visible for user's convenience. The table should present only a predefined number of crash records to prevent overwhelmingly long lists. The list items convey the crash DB number, name and surname of the persons and id number.

6. The user can choose to click a column header to perform a sort based on the fields being presented. This interaction takes the use case to the step 5. Or, when possible, the user can click on a link to view another page of result records. This interaction keeps the user at the step 6. Or, the user clicks on a crash record to proceed to the step 7.

7. The system presents the user a final confirmation page that conveys summary information for both the IFJ journal and the Crash Record Item with the personal detail.

8. The user can choose either to create the association, or to go back, or to decline. If the user chooses to associate the items, the system creates the association between the IFJ and the crash record person. If the user chooses to go back the system moves back to the step 4. If the user chooses to decline, the use-case is aborted by the system.

9. The system creates a feedback either to inform the user about the result of association creation or to assure the user that the operation has been aborted.

Notes:
1. In some occasions, an IFJ cannot be assigned to any crash because the crash has not been recorded yet. For such cases, the user must create the crash record by using the "Crash record entry" use-case to bind the IFJ.

2. For some other rare occasions, the crash record may exist but with missing person detail. For such cases, the user must update the crash record by applying the "Crash record update use-case" to create the person entry first. Then this use-case can be applied.

3. The crash database application creates log for registration of the injury / fatality matching. The log contains at least the date and the time of the record creation, the user identifier who performed this matching, the crash DB serial number, and other details that are enough to identify the IFJ.

4. After the association, the IFJ becomes a bound IFJ.

5. While querying the IFJs and crash records, the scope of the lists will be limited to the regions for which the user can be held responsible. Additionally, for the investigators and the inspectors, the crash list is further limited to those that were entered by the investigator or the inspector.

   This user case depends on possibilities to access hospital data

UC 12.   Releasing injury / fatality journals with crash data

Goal: To break a wrong association that has been created between an IFJ and a person.

Roles allowed:

✓	System administrators
	GIS users
	Statistics users

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	Hospital users	
	Crash data viewers	
✓	Crash data reviewers	
✓	Investigators	
	Inspectors	

Description:

This use case is intended to release the IFJ records that have been associated with wrong person records in the crash database. The investigators can release the IFJs that have associated only with the crash data that were entered by them. There is no such a restriction for the system administrators and the reviewers.

Steps:
1. The user follows the steps as explained in "Finding a crash record".

2. After user selects the intended record the system displays the crash record editing pages where the user locates the person to whom the IFJ associated. The user click on link that is designed to detach the IFJ record.

3. The system presents the user a final confirmation page that conveys summary information for both the IFJ journal and the personal detail.

4. The user can choose either to detach the association, or to decline. If the user chooses to detach the items, the system deletes the association between the IFJ and the crash record person. If the user chooses to go back the system moves back to the step 2.

5. The system creates a feedback either to inform the user about the result of association creation or to assure the user that the operation has been aborted.

Notes:
1. The user interface elements on crash update pages can clearly indicate that an IFJ is assigned to a person.

UC 13. The crash database application creates log for release. The log contains at least the date and the time of the release, the user identifier who released the IFJ, the hospital, the hospital journal number, and the crash DB serial number. Case closure

Goal: To close a crash record to prevent further modifications.

Roles allowed:

✓	System administrators	
	GIS users	
	Statistics users	
	Hospital users	
	Crash data viewers	
✓	Crash data reviewers	
	Investigators	
	Inspectors	

Description:

Case closure is done by the reviewers after generation of the crash record by the investigator or the inspector. The reviewers are responsible for the quality of the data in the crash data form. When the reviewer decides that the crash record has matured enough for closure, he or she closes the case in

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order to prevent further updates and accidental changes. When the crash data record is closed, it cannot be updated by the inspectors and the investigators.

Steps:
1. The user is presented the search parameter window.

2. The user fills out the search parameters.

3. The user starts the search by using search command button / link.

4. The system performs the search based on the parameters supplied and creates a result set. In addition to the constraints specified at first step, the system retrieves only the "open cases" or "temporarily reopened cases".

5. The system presents the result by a window that contains an interactive table. The number of the records and the page number in the record set are visible for user's convenience. The table should present only a predefined number of crash records to prevent overwhelmingly long lists. The list items convey the crash DB number, location of the crash, date of the crash, and the operator who created the crash record.

6. The user can choose to click a column header to perform a sort based on the fields being presented. This interaction takes the use case to the step 4. Or, when possible, the user can click on a link to view another page of result records. This interaction keeps the user at the step 5. Or, the user clicks on a crash record to proceed to step 7.

7. After user selects the intended record the system displays the crash record viewer pages that allow the user to make changes as appropriate. The system also locks the crash record to prevent others to access the crash record.

8. The user chooses "close case" button / link to mark the case as closed.

9. The system updates the page to show the new status of the crash record.

10. The user chooses "quit" link so that the crash record becomes unlocked.

Notes:
1. The system administrators and the reviewers are immune to case closures; meaning that they can modify even the closed cases.

2. The crash database application creates log for closure of the crash record. The log contains at least the date and the time of the closure, the user identifier who closed the record, and the crash DB serial number.

UC 14.   Temporary case opening

Goal: To reopen a closed case to allow unavoidable changes to be made.

Roles allowed:

✓	System administrators
	GIS users
	Statistics users
	Hospital users
	Crash data viewers
✓	Crash data reviewers
	Investigators
	Inspectors

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Description:

Case closure is done by the reviewers after generation of the crash record by the investigator or the inspector. The reviewers are responsible for the quality of the data in the crash data form. When the reviewer decides that the crash record has matured enough for closure, he or she closes the case in order to prevent further updates and accidental changes. When the crash data record is closed, it cannot be updated by the inspectors and the investigators.

Steps:
1. The user is presented the search parameter window.

2. The user fills out the search parameters.

3. The user starts the search by using search command button / link.

4. The system performs the search based on the parameters supplied and creates a result set. In addition to the constraints specified at first step, the system retrieves only the "closed cases".

5. The system presents the result by a window that contains an interactive table. The number of the records and the page number in the record set are visible for user's convenience. The table should present only a predefined number of crash records to prevent overwhelmingly long lists. The list items convey the crash DB number, location of the crash, date of the crash, and the operator who created the crash record.

6. The user can choose to click a column header to perform a sort based on the fields being presented. This interaction takes the use case to the step 4. Or, when possible, the user can click on a link to view another page of result records. This interaction keeps the user at the step 5. Or, the user clicks on a crash record to proceed to step 7.

7. After user selects the intended record the system displays the crash record viewer pages that allow the user to make changes as appropriate. The system also locks the crash record to prevent others to access the crash record.

8. The user chooses "temporarily open the case" button / link to mark the case as "temporarily reopened".

9. The system updates the page to show the new status of the crash record.

10. The user chooses "quit" link so that the crash record becomes unlocked.

Notes:
1. The crash database application creates log for temporary opening of the crash record. The log contains at least the date and the time of the temporary opening, the user identifier who opened the record, and the crash DB serial number.

UC 15.   Case promotion

Goal: To assign a case that was previously assigned to an inspector to an investigator.

Roles allowed:

	System administrators
	GIS users
	Statistics users
	Hospital users
	Crash data viewers
	Crash data reviewers
✓	Investigators

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Inspectors

Description:

In some occasions, the case started by an inspector may need to be assigned to an investigator. In such cases the investor becomes responsible for the content of the crash record. In order to change the owner of the crash record this use-case is applied. This use-case is specifically designed for the investigators who wish to undertake the case.

Steps:

1. The user is presented the search parameter window.

2. The user fills out the search parameters.

3. The user starts the search by using search command button / link.

4. The system performs the search based on the parameters supplied and creates a result set. In addition to the constraints specified at first step, the system retrieves only the cases assigned to the inspectors working in the same region with the investigator.

5. The system presents the result by a window that contains an interactive table. The number of the records and the page number in the record set are visible for user's convenience. The table should present only a predefined number of crash records to prevent overwhelmingly long lists. The list items convey the crash DB number, location of the crash, date of the crash, and the operator who created the crash record.

6. The user can choose to click a column header to perform a sort based on the fields being presented. This interaction takes the use case to the step 4. Or, when possible, the user can click on a link to view another page of result records. This interaction keeps the user at the step 5. Or, the user clicks on a crash record to proceed to step 7.

7. After user selects the intended record the system displays the crash record viewer pages that allow the user to make changes as appropriate. The system also locks the crash record to prevent others to access the crash record.

8. The user chooses "promote the case" button / link to undertake the case.

9. The system presents another page to receive the confirmation from the investigator.

10. If the investigator confirms that he or she wants to undertake the case the system proceeds to step 11. Otherwise the system returns to the step 7.

11. The system updates the crash record so that the investigator becomes the owner. The system releases the lock on the crash record.

Notes:

1. Only the investigators can run this use-case. The system administrators are not allowed to execute this use-case. To change the owner of a case, they need to apply "case assignment" use-case.

2. The crash database application creates log for case promotion of the crash record. The log contains at least the date and the time of the case promotion, the user identifier who promoted the record, and the crash DB serial number.

UC 16.   Case assignment

Goal: To assign a case to an investigator or to an inspector.

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Roles allowed:

✓	System administrators
	GIS users
	Statistics users
	Hospital users
	Crash data viewers
✓	Crash data reviewers
✓	Investigators
	Inspectors

Description:

In some occasions, the case started by an inspector may need to be assigned to an investigator. In such cases the investor becomes responsible for the content of the crash record. In order to change the owner of the crash record this use-case is applied. This use-case is specifically designed for the investigators who wish to undertake the case.

Steps:

1. The user is presented the search parameter window.

2. The user fills out the search parameters.

3. The user starts the search by using search command button / link.

4. The system performs the search based on the parameters supplied and creates a result set. In addition to the constraints specified at first step, the system retrieves only the cases assigned to the inspectors working in the same region with the investigator.

5. The system presents the result by a window that contains an interactive table. The number of the records and the page number in the record set are visible for user's convenience. The table should present only a predefined number of crash records to prevent overwhelmingly long lists. The list items convey the crash DB number, location of the crash, date of the crash, and the operator who created the crash record.

6. The user can choose to click a column header to perform a sort based on the fields being presented. This interaction takes the use case to the step 4. Or, when possible, the user can click on a link to view another page of result records. This interaction keeps the user at the step 5. Or, the user clicks on a crash record to proceed to step 7.

7. After user selects the intended record the system displays the crash record viewer pages that allow the user to make changes as appropriate. The system also locks the crash record to prevent others to access the crash record.

8. The user chooses "assign the case" button / link to undertake the case.

9. The system presents another page to receive the registration number of the investigator or the inspector who will own the case.

10. The system presents a final confirmation screen before changing the owner. If the user confirms, system proceeds to step 11. Otherwise the system returns to the step 7.

11. The system updates the crash record so that the specified investigator or inspector becomes the owner. The system releases the lock on the crash record.

Notes:

1. The investigators can assign cases only to inspectors. The other allowed users can assign cases to both inspectors and investigators.

2. The system does not allow assigning a case with fatalities to an inspector.

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3. The crash database application creates log for case assignment of the crash record. The log contains at least the date and the time of the case assignment, the user identifier who assigned the record, the inspector's or the investigator's number who previously owned the case, the inspector's or the investigator's number who has become the new owner of the case, and the crash DB serial number.

UC 17.   CCI verification

Description:

The Criminal Case Identifier (CCI) verification occurs when the user wants to enter a criminal case identifier that binds the crash record with the electronic criminal case file that has been hosted by the Ministry of Justice. This use-case is about validation of the criminal case identifier at time of user input while creating a new crash record or updating an existing crash record.

Steps:
1. The user chooses a link or button to enter a CCI.

2. The system presents user an input box where the CCI can be entered.

3. The user enters the number and chooses the link to proceed. At this step the user may want to cancel.

4. The system receives the CCI and invokes the web service hosted by the MoJ with the CCI parameter. The response from the remote system contains essential information with two parts. The first part indicates whether the CCI is found valid or not. If the CCI is valid, the second part contains time, location, and people's names if applicable.

5. If the CCI is not valid, the system presents an error message ends this use-case.

6. If the CCI is valid, the system presents another window showing details about the CCI to give a chance to the user to verify the details. If the user is sure the CCI is correct, he or she confirms this so that the CCI gets recorded. Otherwise, the system goes back to the step 2.

Notes:
1. This use-case is designed for being invoked from other use-cases.

UC 18.   Vehicle number verification

Goal: To validate a vehicle number and to retrieve basic vehicle information.

Description:

The Vehicle Number (VN) verification occurs when the user wants to enter a vehicle number. This use-case is about validation of the VN at time of user input while creating a new crash record or updating an existing crash record.

Steps:
1. The user chooses a link or button to enter a VN.

2. The system presents user input boxes where the VN and type of the VN can be entered.

3. The user enters the number and chooses the link to proceed. At this step the user may want to cancel.

4. The system receives the VN data and invokes the web service hosted by the MoIA with the VN parameters. The response from the remote system contains essential information with two

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    parts. The first part indicates whether the VN is found valid or not. If the VN is valid, the second part contains brand, model, and year of production.

5. If the VN is not valid, the system presents an error message ends this use-case.

6. If the VN is valid, the system presents another window showing details about the VN to give a chance to the user to verify the details. If the user is sure the VN is correct, he or she confirms this so that the VN brand, model, and year of production get recorded. Otherwise, the system goes back to the step 2.

Notes:
1. This use-case is designed for being invoked from other use-cases.

2. Based on the type of VN, the remote system implementing the web service will access to the Vehicle Registration System or Transit Vehicle Registration system. Both systems are hosted by the MoIA.

3. The VN type can be one of the followings.

    a. Georgian plate number

    b. Georgian transit plate or sticker number

    c. Foreign plate number (native or transit)

    d. VIN (Vehicle Identification Number)

    e. Technical passport number

UC 19.   Personal id verification

Goal: To validate a personal id and to retrieve basic personal information.

Description:
The Personal Id (PI) verification occurs when the user wants to enter a vehicle number. This use-case is about validation of the PI at time of user input while creating a new crash record or updating an existing crash record.

Steps:
1. The user chooses a link or button to enter a PI.

2. The system presents user input boxes where the PI and type of the PI can be entered.

3. The user enters the number and chooses the link to proceed. At this step the user may want to cancel.

4. The system receives the PI data and invokes the web service hosted by the MoIA with the PI parameters. The response from the remote system contains essential information with two parts. The first part indicates whether the PI is found valid or not. If the PI is valid, the second part contains name, surname, date of birth, and gender.

5. If the PI is not valid, the system presents an error message ends this use-case.

6. If the PI is valid, the system presents another window showing details about the PI to give a chance to the user to verify the details. If the user is sure the PI is correct, he or she confirms this so that the PI contains name, surname, date of birth, and gender get recorded. Otherwise, the system goes back to the step 2.

Notes:
1. This use-case is designed for being invoked from other use-cases.

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2. Based on the type of the PI the remote system that implements the web service accesses either the "Copy Civil Registry System" or the "Border Crossing System".

3. The PI type can be one of the followings.

   a. Georgian personal identifier

   b. Passport number

UC 20.   Report design

Goal: To design a report and classify it so that users can access and run.

Roles allowed:

✓	System administrators
	GIS users
✓	Statistics users
	Hospital users
	Crash data viewers
	Crash data reviewers
	Investigators
	Inspectors

Description:
The crash database is capable of allowing users to create or update the reports that will be published on the interactive pages of the crash database. The reports are usually for statistical purposes and they may contain tables and charts as appropriate. This use case is about making use of the report generator component which is the underpinning part of the "crash reporting function" of the crash database.

Steps:
1. The user launches the report designer component of the crash database.

2. The user opens an existing design or chooses to design a new report.

3. By interacting with the designer user interface, the user creates the intended report design description.

4. The user saves the design by assigning a name to the design.

Notes:
1. The report designer allows the user to specify the type of the report that will be generated. Listings and cross-tabs should be possible.

2. The report designer allows the user to collect data multiple tables stored in the database.

3. The report designer allows the user to establish filters and conditions so that the records that will be covered by the report can be constrained.

4. The report designer allows the user to specify grouping and sorting of the data. Groupings can have a rich set of aggregates like sum, average, and similar.

5. The report designer allows the user to define calculated fields.

6. The report designer is capable of generating page and report level totals and summaries.

7. The report designer allows the user to place report design elements that cover data tables, static and calculated text fields with support of rich formatting options including fonts, borders, colors, filling patterns, shading, and similar.

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8. The report designer allows parameter definitions that can be passed by the crash database application.

9. The report designer allows user-parameters which will be specified by the end-user while running the report.

UC 21.   Report classification

Goal: Tagging an existing report design so that it can be published for the end-user.

Roles allowed:

✓	System administrators
	GIS users
✓	Statistics users
	Hospital users
	Crash data viewers
	Crash data reviewers
	Investigators
	Inspectors

Description:

After a report is designed it should be classified and given appropriate tags so that the users who will run the report can find a reasonable access path to locate and run it. The crash database application is capable of recognizing the tags associated with the reports. By interpreting the tags, the crash database pages can create the hierarchical view of existing reports. The user can navigate this hierarchical organization to locate the report.

Steps:

1. The user opens the crash database page where the list of designed reports and their associated tags can be seen.

2. The user selects one of the reports to edit its tags.

3. The system responds with proper user interface elements to enable the user to edit the tags.

4. The user edits the tags and request recording of the tags.

5. The system associates the tags to the selected report.

Notes:
1. The effect of tag editing is immediate on the report browsing pages where the user finds and launches reports.

2. There is a system space designated to create the pool of reports where the report designer places the report designs (report objects) and the crash database can locate these report objects.

UC 22.   Report generation

Goal: To run a report on the crash database.

Roles allowed:

✓	System administrators

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		GIS users
✓		Statistics users
		Hospital users
✓		Crash data viewers
✓		Crash data reviewers
✓		Investigators
		Inspectors

Description:

The report generation use-case is for the end-user who wants to generate a report. The reports are accessible through the report browser pages supplied by the crash database application. The crash database prepares the report as a file that is in industry standard formats which may allow editing. The output can be browsed by the appropriate viewers or editors.

Steps:

1. The user opens the pages that allow navigation of the reports in a hierarchy that has been defined by the tags of the reports.

2. The user navigates the hierarchy and locates the report to run.

3. The user launches the report by selecting it.

4. The system may ask the user to supply parameters if it is needed. The user enters the necessary parameters.

5. The system prepares the report and posts the output file back to the user's computer.

6. The user stores or views the report.

Notes:

UC 23.   Finding a regional office / police station

Goal: To specify the regional office/police station

Roles allowed:

✓	System administrators
	GIS users
	Statistics users
	Hospital users
	Crash data viewers
✓	Crash data reviewers
	Investigators
	Inspectors

Description:

The crash database application contains a registry of official units where the inspectors or the investigators are bound to. This use-case is necessary for identification of the police unit that intervened the crash. Each of the investigators and inspectors is bound to a police unit contained in this registry.

Steps:

1. The user is presented an input box to enter some keywords to find in the name of the regional office / police station.

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2. The user enters the keywords and requests a list by clicking on "list" link. Note here that, it is allowable for the user not to specify a keyword in order to create the complete list of the police units. Or, instead of requesting the list, the user may decline to specify a police unit by choosing "cancel".

3. The system presents the result by a window that contains an interactive table. The number of the records and the page number in the record set are visible for user's convenience. The table should present only a predefined number of "police unit" lines to prevent overwhelmingly long lists. The list items convey the names of the regional offices / police stations.

4. At this point the user interacts with the table to locate the "police unit" in the list. After finding the intended "police unit", the user selects it by clicking on it. This action specifies the "police unit" and finalizes the use-case. Or, alternatively, the user may choose to go back to the step 1 to specify another set of keywords. One other option the user has at this stage is declining to choose a "police unit" by cancelling selection.

Notes:
1. Depending on the context in which this use-case is applied, the system decides to list the "inactive" police units or not. While recording or updating a crash record, the system avoids listing the "inactive" police unit entries in order to prevent erroneous attempts like creating a crash record coming from an "inactive" police unit.

UC 24.   Creating a regional office / police station entry

Goal: Creating a new regional office or police station object in the crash database.

Roles allowed:

✓	System administrators
	GIS users
	Statistics users
	Hospital users
	Crash data viewers
	Crash data reviewers
	Investigators
	Inspectors

Description:

The crash database application contains a registry of the regional offices / police stations (police units) which is maintained by the system administrator. A police unit that creates a crash record must be a registered one so that the relevant users (inspectors / investigators) can be defined.

Steps:

1. The system presents a blank "police unit" registration form.

2. The user fills in details like name, location, type (regional office or police unit) and contact information. If this is a police station, the user specifies the pre-registered regional office which this police station is bound to.

3. The user chooses the "record" button to create a new police unit entry in the system.

4. The system tries to create a new police unit entry in the registry of the police units with the data given by the user. It reports the result of the operation by presenting a message.

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Notes:
1. The police unit data contain details like name, address, contact person, and contact information. The location data explicitly specify the city/municipality/district coded.

2. Only the system administrators are allowed to create a new police unit entry.

UC 25.   Viewing and updating a regional office / police station entry

Goal: To view and update an existing police unit entry.

Roles allowed:

✓	System administrators
	GIS users
	Statistics users
	Hospital users
	Crash data viewers
	Crash data reviewers
	Investigators
	Inspectors

Description:

This use-case aims at viewing details of a police unit object in the system. While viewing, the user can make changes in the police unit entry in order to update details like contact information, being active, and similar.

Steps:
1. The user follows the steps in the use case named "Finding a regional office / police station" in order to specify the police unit entry that will be viewed.

2. The system switches to the police unit data view / update pages with the user interface elements that can be used for navigating and changing the hospital data.

3. The user interacts with the system for review and update.

Notes:
1. Only the system administrators are allowed to update an existing police unit entry.

2. In case a police unit is closed, its record can be updated as "inactive" meaning that no more crash records can be posted from the police unit.

UC 26.   Removing a regional office / police station entry

Goal: To delete a police unit entry from the crash database.

Roles allowed:

✓	System administrators
	GIS users
	Statistics users
	Hospital users
	Crash data viewers
	Crash data reviewers
	Investigators

	Inspectors

Description:

The crash database may contain police unit entries that have been added wrongfully. If removal of a police station entry is needed, the system administrator can follow the steps of this use-case.

Steps:

1. The user follows the steps in the use case named "Finding a regional office / police station" in order to specify the police station entry that will be viewed.

2. The system switches to the hospital data view pages with the user interface elements that can be used for navigating the hospital data.

3. The user interacts with the system and chooses the delete button / link.

4. The system presents the user to receive a final confirmation for deletion of the police unit entry.

5. If the user confirms the request, the system deletes the police unit entry.

Notes:
1. Only the system administrators are allowed to delete a police unit entry.

2. If a hospital is closed and should no longer be used for crash data recording, it should be closed to become "inactive" by using "Viewing and updating a regional office / police station entry" use-case. This use-case is intended to delete the wrong police unit entries only.

UC 27.   Finding a hospital for data entry

Goal: To specify a hospital entry.

Roles allowed:

✓	System administrators
	GIS users
	Statistics users
	Hospital users
	Crash data viewers
✓	Crash data reviewers
✓	Investigators
	Inspectors

Description:

The crash database application contains a registry of the hospitals which is maintained by the system administrator. The "hospital users" are bound to the hospitals in this registry. When a "hospital user" connects to the crash database application, the system assumes that the IFJ related operations performed by the user are done on behalf of the associated hospital. It should be noted here that more than one "hospital user" can be associated a hospital. But, a user cannot be associated with more than one hospital. Since the hospital of a "hospital user" is known by the crash database application, this use-case does not apply for the "hospital users". In other words, the crash application does not ask a "hospital user" to specify the hospital. On the other hand, the system administrators, the reviewers, and the investigators need to find the hospital to enter data that has been received from the hospital on IFJ forms.

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Steps:
1. The user is presented an input box to enter some keywords to find in the name of the hospital.

2. The user enters the keywords and requests a list by clicking on "list" link. Note here that, it is allowable for the user not to specify a keyword in order to create the complete list of the hospitals. Or, instead of requesting the list, the user may decline to specify a hospital by choosing "cancel".

3. The system presents the result by a window that contains an interactive table. The number of the records and the page number in the record set are visible for user's convenience. The table should present only a predefined number of hospital lines to prevent overwhelmingly long lists. The list items convey the names of the hospitals.

4. At this point the user interacts with the table to locate the hospital in the list. After finding the intended hospital, the user selects it by clicking on it. This action specifies the hospital and finalizes the use-case. Or, alternatively, the user may choose to go back to the step 1 to specify another set of keywords. One other option the user has at this stage is declining to choose a hospital by cancelling selection.

Notes:

1. Depending on the context in which this use-case is applied, the system decides to list the "inactive" hospitals or not. While recording or updating an IFJ, the system avoids listing the "inactive" hospital entries in order to prevent erroneous attempts like creating an IFJ record coming from an "inactive" hospital.

UC 28.   Recording a hospital entry

Goal: Creating a new hospital object in the crash database.

Roles allowed:

✓	System administrators
	GIS users
	Statistics users
	Hospital users
	Crash data viewers
	Crash data reviewers
	Investigators
	Inspectors

Description:

The crash database application contains a registry of the hospitals, which is maintained by the system administrator. A hospital that sends IFJs must be a registered one so that the relevant users can be defined and hence, the IFJs can be recorded from the hospital.
Steps:
1. The system presents a blank hospital registration form.

2. The user fills in details like name, location, and contact information.

3. The user chooses the "record" button to create a new hospital entry in the system.

4. The system tries to create a new hospital entry in the registry of the hospitals with the data given by the user. It reports the result of the operation by presenting a message.

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Notes:
1. The hospital data contain details like name, address, contact person, and contact information. The location data explicitly specify the city/municipality/district coded.

2. Only the system administrators are allowed to create a new hospital entry.

UC 29.   Viewing and updating a hospital entry

Goal: To view and update an existing hospital entry

Roles allowed:

✓	System administrators
	GIS users
	Statistics users
	Hospital users
	Crash data viewers
	Crash data reviewers
	Investigators
	Inspectors

Description:

This use-case aims at viewing details of a hospital object in the system. While viewing, the user can make changes in the hospital entry in order to update details like contact information.

Steps:
1. The user follows the steps in the use case named "Finding a hospital for data entry" in order to specify the hospital entry that will be viewed.

2. The system switches to the hospital data view / update pages with the user interface elements that can be used for navigating and changing the hospital data.

3. The user interacts with the system for review and update.

Notes:
1. Only the system administrators are allowed to update an existing hospital entry.

2. In case a hospital is closed, its record can be updated as "inactive" meaning that no more IFJs can be posted from the hospital.

UC 30.   Removing a hospital entry

Goal: To delete a hospital entry from the crash database hospital registry.

Roles allowed:

✓	System administrators
	GIS users
	Statistics users
	Hospital users
	Crash data viewers
	Crash data reviewers
	Investigators
	Inspectors

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Description:

The crash database may contain hospital entries that have been added wrongfully. If removal of a hospital entry is needed, the system administrator can follow the steps of this use-case.

Steps:
1. The user follows the steps in the use case named "Finding a hospital for data entry" in order to specify the hospital entry that will be viewed.

2. The system switches to the hospital data view / update pages with the user interface elements that can be used for navigating the hospital data.

3. The user interacts with the system and chooses the delete link / button.

4. The system presents the user to receive a final confirmation for deletion of the hospital entry.

5. If the user confirms the request, the system deletes the hospital entry.

Notes:
1. Only the system administrators are allowed to delete a hospital entry.

2. If a hospital is closed and should no longer be used for IFJ recording, it should be closed to become "inactive" by using "Viewing and updating a hospital entry" use-case. This use-case is intended to delete the wrong hospital entries only.

UC 31.   User editing

Goal: To add or remove the association between the units / hospitals and the users.

Roles allowed:

✓	System administrators
	GIS users
	Statistics users
	Hospital users
	Crash data viewers
	Crash data reviewers
	Investigators
	Inspectors

Description:

The IT department of the Ministry of Interior commits the services to manage the users of the system. These services are implemented through "web services" to allow listing, user data retrieval, and role assignment. For the user management part, the only functionality that should be supported by the crash database application is keeping registries of associations between the users and the police units or the hospitals. This use case is intended to edit these associations.

Steps:
1. The user opens the crash database page for user editing.

2. The system responds with the list of the users to allow the user to select a user item. The list can be filtered so that the user can reduce the number of the items in the list.

3. The user selects a "user item".

4. The system responds with another page conveying the user details like name, surname and associated police unit or hospital depending on the type of the user.

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5. By interacting with the page, the user can delete associations or create new ones. While creating new ones, the system applies either "Finding a regional office / police station" or "Finding a hospital for data entry", depending on the type of the user.

Notes:
1. The system finds the type of the user by querying the roles assigned to the user. This is done by using the "user management web services", which are external to the crash database application.

UC 32.   Viewing on GIS

Goal: To create view of the accidents on GIS layers / maps

Roles allowed:

	System administrators
✓	GIS users
	Statistics users
	Hospital users
	Crash data viewers
	Crash data reviewers
	Investigators
	Inspectors

Description:

The GIS user accesses to the predefined "data-views" on the crash database. Usually, these views are fixed during system development. The views are capable of conveying useful data about time, location, severity, number of killed and injured, and similar. It should be kept in mind that the views can be modified or enriched to meet the data requirements of the "Roads Department". The GIS at the "Roads Department" can apply additional transformations and filtering on the data coming from the "data-views" on the source crash database. It is the GIS user's responsibility to design and use the GIS data views. The system administrator co-operates with the GIS user to define these data views on the crash database side. It is assumed that the GIS computer can access to the crash database as explained in "Crash Database Tiers and Network Connections" section. When the GIS user applies the steps in this use case, he or she can create visual representation on the GIS layers.

Steps:

1. The GIS user ensures that the connection to the source crash database is up and running.

2. By interacting with the GIS user interface, the user requests the GIS to update the selected views using the existing connections.

3. The GIS connects to the crash database, reads relevant data, and generates the desired output.

Notes:
1. The GIS being used by the Roads Department is ARCGIS from ESRI. It supports connection to the relational database management systems that make this use case possible.

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UC 33.   Querying the IFJ Data

Goal: To query IFJ data through web services

Roles allowed:

	System administrators
	GIS users
	Statistics users
✓	Hospital users
	Crash data viewers
	Crash data reviewers
	Investigators
	Inspectors

Description:

This use-case is specifically designed for the hospitals that intend to integrate the hospital information system with the crash database application.
Steps:
1. The hospital information system posts the web request with the parameters required.

2. The crash database prepares a response and posts it back.

3. The hospital information system processes the response further to take appropriate action.

Notes:
1. The hospital must supply the credentials (user-name, password, and others if applicable) necessary to retrieve the data.

2. The retrieved data will contain only the IFJ records posted by the hospital that originates the request.

3. For each IFJ in the crash database, the crash database application generates a unique IFJ identifier. These identifiers are included in the response.

UC 34.   Posting the IFJ Data

Goal: To query IFJ data through web services

Roles allowed:

	System administrators
	GIS users
	Statistics users
✓	Hospital users
	Crash data viewers
	Crash data reviewers
	Investigators
	Inspectors

Description:

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This use-case is specifically designed for the hospitals that intend to integrate the hospital information system with the crash database application.

Steps:
1. The hospital information system posts the web request with the parameters required. It specifies the operation code as one of "insert", "update", "delete". If the operation code is "delete" only the IFJ object identifier is enough. For updates, the IFJ object identifier must be supplied. For inserts, the IFJ object identifier must be blank. For updates and inserts, relevant IFJ data must be included in the request as determined by the implementation specific web service description. This description covers the IFJ parameters that can be found in "Injury / Fatality Journal" section.

2. The crash database prepares a response and posts it back.

3. The hospital information system processes the response further to take appropriate action.

Notes:
1. The hospital must supply the credentials (user-name, password, and others if applicable) necessary to retrieve the data.

2. The operation is applicable only within the scope of the hospital.

3. The crash database application rejects deleting an IFJ record that has been associated with a person entry in the crash database.

Access and Parameter Control

The requests received by the application will be authorized by the access control mechanism before being processed. If the request cannot pass the authorization requirements, the crash data application rejects processing and informs the sender about the authorization failure. When a request is received by the application, the application knows the **user** who originated request, the type of the request, and **the request parameters**. By using the data stored at the server site, the application can easily find the **roles** of the user, and the **region**, which this user is responsible for, and the **hospital** which this user is working for where applicable. The request parameters may specify the region and hospital. For the hospital users the region and the hospital parameters are fixed on the server side, meaning that the region and hospital parameter values for this type of users will not be processed.

| Role	Applicable Parameters	
	Region	Hospital
System administrators		
GIS users		
Statistics users		
Hospital users		
Crash data viewers	✓	
Crash data reviewers	✓	✓
Investigators	✓	✓
Inspectors	✓	✓

The application server cannot assume that the request is coming from a trusted client agent. This also means that the application cannot assume the safety of the parameters including the ones about the access control. In order to make this point clear, an example of simple crash record creation can be given. It should be expected that the application page designed to receive district name while creating a new crash data record. If the page is generated for an inspector, it would be a good choice for the application to generate a page with a drop-down list that contains the names of the possible districts within the region that inspector is responsible for. Theoretically the user has to make a choose one of

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the options presented by the drop-down list, and hence, the "district parameter" that will be received will be one of these valid entries. If the application assumes safety of the "district parameter" and omits the control based on this theory, it will be prone to malformed requests that may arise from attacks, malfunctioning or tampered client agents. The application software must perform all kind of checks on server side before processing. In order to increase the effectiveness of the user interface and to reduce the amount of messaging between the client and the server, the client agent can be furnished with rich user interface elements and client side control logic. But existence of client side control logic will never eliminate the necessity of the control at the server side.

Crash Database Tiers and Network Connections
Below figure shows the system components and the connections at a logical level.
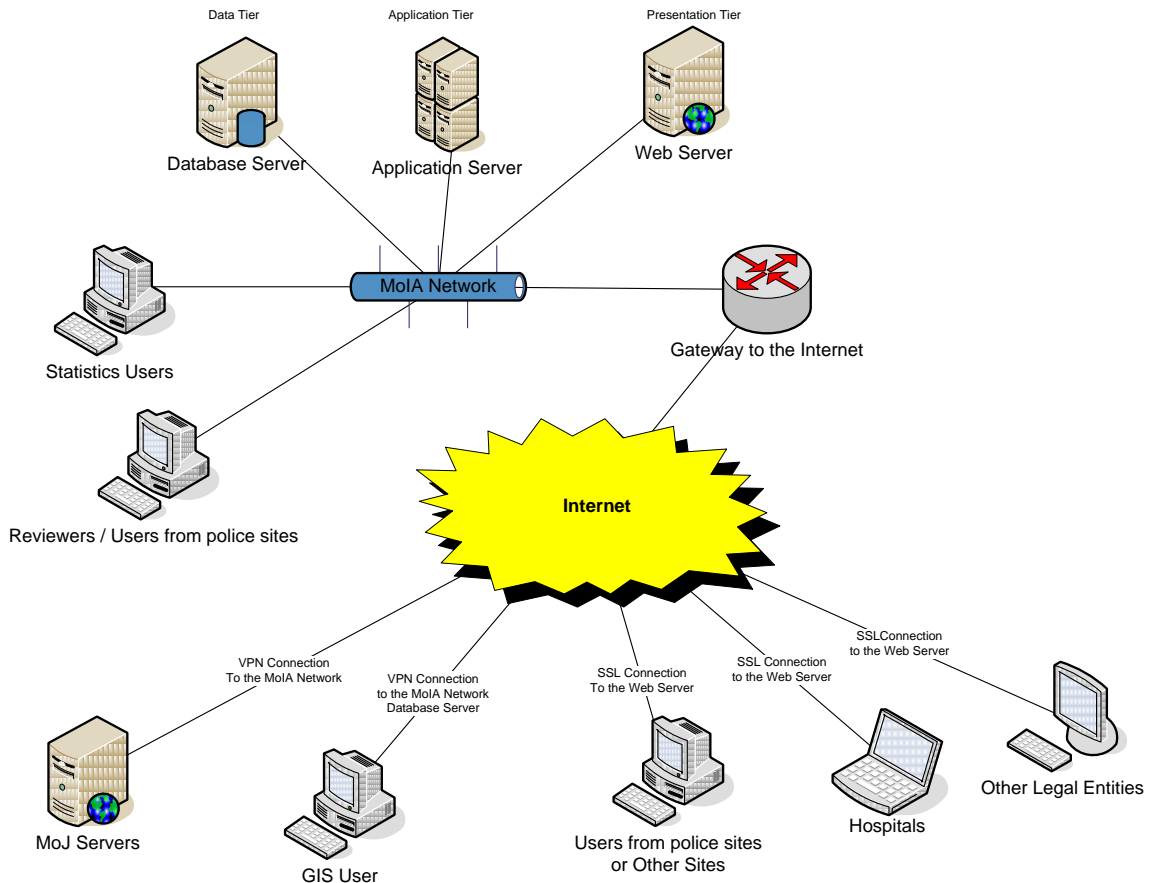
The internals of the MoIA network is managed by the MoIA IT department. In order to make use of the central statistics application analysis services, the "statistics users" will be connected to the web server over the web pages of the crash database application. The reviewers and the users from the police sites (inspectors and investigators from the regional offices and police stations) will access to the web server to use the crash database application. The integration with the "Criminal Case Registration System" hosted by MoJ servers requires a VPN connection between the MoJ and MoIA networks. The crash database application will be able to validate the Criminal Case Identifiers supplied by the Investigator by exchanging messages over this VPN connection. Another VPN connection must be established between the Roads Department and the MoIA. The GIS being operated by the Roads Department will need to connect the database server of the crash database application to **read** data. The views made available to the GIS user will be accessed over this VPN. The connection profile that will be supplied for the database access will be limited to the views that are specifically designed for the GIS integration. For the rare conditions that the inspectors or the investigators have to access to the crash database application over the Internet, SSL connections to the application will be supplied. The hospitals that originate injury / fatality journals are member of another group that needs

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to access to the crash database application over the Internet. For the other entities like Municipality Administrations, crash data viewing and reporting will be made available over the Internet.

Crash Parameters and Other Data in Electronic Crash Record

Following is the list of the crash parameters that will be collected by the crash data form.
1. Accident location
    1.1. Road / location name

    Name of the road.
    1.2. Distance from origin

    The kilometer and the meters that indicate the distance of the assumed origin for the road specified.
    1.3. GPS Coordinates
        1.3.1. N

    The longitude of the crash location.
        1.3.2. E

    The latitude of the crash location.
    1.4. District

    The district where the crash occurred.
2. Accident time
    2.1. Date

    Date of the accident
    2.2. Time

    Time of the accident
3. Accident Environment and Road Condition
    3.1. Road characteristics
        3.1.1. Road type

    One of the following options:
    - Straight road

    - C Curve

    -][Bridge

    - = Road / rail crossing

    - Tunnel

    - Inclination %

    3.2. Surface type of Roadway

    One of the following options:
    - Bitumen

    - Concrete

    - Gravel

    - Cobblestones

    - Earth

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3.3. Surface Condition of Roadway

3.3.1. Condition variable 1

One of the following options:
- Good / fair

- Damaged

3.3.2. Condition variable 2

One of the following options:
- Dry

- Wet

- Ice / snow

3.3.3. Condition variable 3

Checked if the road was covered by dust.

3.4. Street lights

One of the following options:
- On

- Existing but off

- Does not exist

3.5. Traffic signals

One of the following options:
- Signal functioning

- Signal yellow blinking

- Signal off or broken

- No signal

3.6. Junction type

One of the following options:
- O roundabout

- T junction

- Y junction

- + junction

3.7. Climate Condition

One of the following options:
- Sunny

- Rainy

- Foggy

- Stormy

- Snowy

3.8. Lighting

One of the following options:

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- - Daylight

- - Night

- - Dawn

- - Dusk

   3.9. Surroundings

     One of the following options
- - Built-up area

- - Not built-up area

4. Comments (Missing traffic management elements)

   4.1. Road Signs

     Checked if there are missing road signs.

   4.2. Road markings

     Checked if there are missing road markings.

   4.3. Road Fence (guardrails, parapets)

     Checked if road fence is needed.

   4.4. Directing arrangements (orientation piles, bollard lights, safety islands)

     Checked if directing arrangements are needed.

   4.5. Speed bumps

     Checked if speed bumps are needed.

   4.6. Other please specify

     Checked is some other element is missing.

5. Crash type

  One of the following options:
- - From opposite directions

- - From the same direction

- - From crossing directions

- - Direction unspecified

- - Single vehicle overturning

- - Collision with a parked car

- - Collision with an obstacle

- - Collision with a bicycle

- - Collision with a pedestrian

- - Collision with an animal

- - Other

6. Contributory factors

  One of the following options:
- - Violation of traffic rules by driver

- - Vehicle defect

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- Passenger fault

- Pedestrian fault

- Road condition

- Obstacles

- Weather conditions

- Missing traffic management items

- Other

7. Involved vehicles

   7.1. Vehicle index number

      Specifies the index number of the vehicle in context of the accident. The same numbers shall be seen on the sketch

   7.2. Vehicle type

      One of the following options:
- Car

- Light truck (total weight <3.5 tons)

- Heavy truck (total weight <= 3.5 tons)

- Minibus

- Bus

- Motorcycle

- Other

   7.3. Defects

      One of the following options:
- Steering, front axle

- Wheels, tires

- Windscreen

- Defective light

- Overloading

   7.4. Vehicle movement

      One of the following options:
- Straight Ahead

- Turning Left

- Turning Right

- U-Turn

- Overtaking

- Changing Lane

- Reversing

- Standing Still

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- Stopping

- Other

- Unknown

7.5. Vehicle id type

7.5.1. Vehicle id type

The type of the vehicle identifier. It is encoded as follows [2]:
P: Georgian plate
T: Georgian transit plate
V: VIN number
R: Vehicle registration number.

7.5.2. Vehicle number

Number of the vehicle.

7.6. Brand

Brand of the vehicle.

7.7. Model

Model of the vehicle.

7.8. Year of production

Production year of the vehicle.

8. Involved People

8.1. Person index

The person's index number in context of the accident.

8.2. Category

One of the following 3 options:
- Passenger

- Pedestrian

Driver From Vehicle number is filled in for every person

8.3. Gender

One of the following options:
- Male

- Female

8.4. Age

- The age of the person

8.5. Injury

One of the following options:
- Killed

- Serious

- Minor

- None

8.6. Seat belt usage

---

[2] These letters will be replaced by the most appropriate Georgian equivalents.

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One of the following options:
- Used

- Not Used

- Not Applicable

8.7. Helmet usage

One of the following options:
- Used

- Not Used

- Not Applicable

8.8. Alcohol

One of the following options:
- Sober

- Drunk

- Was not possible to conduct alcohol test

8.9. Drug suspicion

Must be checked if there is a drug suspicion.

8.10. Violation of traffic rules

One of the following options for a person
- Too high speed (Driver)

- Neglecting red light / stop (Driver)

- Did not give way (Driver)

- Ignore traffic sign /road marking (Driver)

- Careless overtaking (Driver)

- Sudden change of direction (Driver)

- Reversing Negligently (Driver)

- Tail-gating, keeping too close (Driver)

- Incorrect stopping / parking (Driver)

- Blinded by sun / oncoming vehicle (Driver)

- Did not keep to near side (Driver)

- Fatigued, sleepy, illness (Driver)

- Violating road crossing rules by pedestrian

- Unidentified

- Pedestrian Movement Walking along the road

- Crossing road outside pedestrian crossing

- Crossing road at pedestrian crossing

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- Other (Either driver or not)

8.11. Identification

8.11.1. Nationality

Nationality of the person.

8.11.2. Id number (Georgian ID card, Passport of citizen of foreign country)

The number on the document.

8.11.3. Name

Name of the person.

8.11.4. Surname

Surname of the person.

8.12. Driving license

8.12.1. Category

Category of the driving license.

8.12.2. Experience in years

Driving experience.

8.12.3. Number

The number of the driving license.

8.13. Telephone

Telephone number of the person

8.14. Address

Address of the person. C

8.15. Written description of the accident

In addition to the parameters coming from the crash data form, followings are registered by the crash database application.

| Data	Description
Crash DB serial number	This is the unique identifier of the electronic crash record.
Investigator / inspector number	The personnel identifier of the investigator or the inspector.
Status	Case can be "open", "closed", or "temporarily open".
IFJ system key	A person record in crash record can be associated with an injury / fatality journal (IFJ). The system holds this association by storing system key of the IFJ.
Criminal Case Identifier	A criminal case identifier is associated to a crash record when required. Criminal case identifiers are issued by the criminal case recording system that is being hosted by the Ministry of Justice.
Regional Office / Police Station Identifier	The identifier of the unit that intervened the accident.

Injury / Fatality Journal

An injury / fatality journal (IFJ) is the data posted by the hospital to the crash database application. There are three possible ways of sending this data:

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1. Using web-services: The crash database has a set of web services to create, to query, to retrieve, to update the IFJ records. For the hospitals having an IT infrastructure matured enough to communicate with the IFJ web services of the crash database application, posting of IFJ can be automated without requiring extra human effort to fill-out the IFJ form if all the necessary information has been captured by the hospital information system.

2. Using crash database web pages: The crash database application has secure pages accessible on the Internet to allow the authorized hospital users to fill-out the IFJ pages. These pages enable the hospital user to create and edit IFJ records on-line.

3. Posting / faxing manual IFJ pages: This option is designed as a last resort for capturing IFJ data. The hospitals must have blank IFJ forms for filling-out and posting. After the hospital authority posts the IFJ page to the investigator's office, the investigator will enter the form content to the crash database application by using the interactive IFJ pages.

The IFJ page will contain following data elements.

- The hospital journal number (the unique identifier for the case generated by the hospital)

- The citizenship number or the passport number (if available)

- The nationality of the person (if available)

- The name and the surname of the person (if available)

- Gender

- Age (may be approximate)

- Arrival time

- Arrived in ambulance (yes or no)

- Police was present (yes or no)

- Crash DB number (if available at the moment of reporting)

- Arrived dead (yes or no)

- Level of injury (max AIS, ISS if applicable)

- Sent to another hospital (yes or no; if yes which one)

- Sent home after treatment (yes or no)

- Left the hospital on his / her own will (yes or no)

- Injuries per body part. The body parts can be seen below picture.

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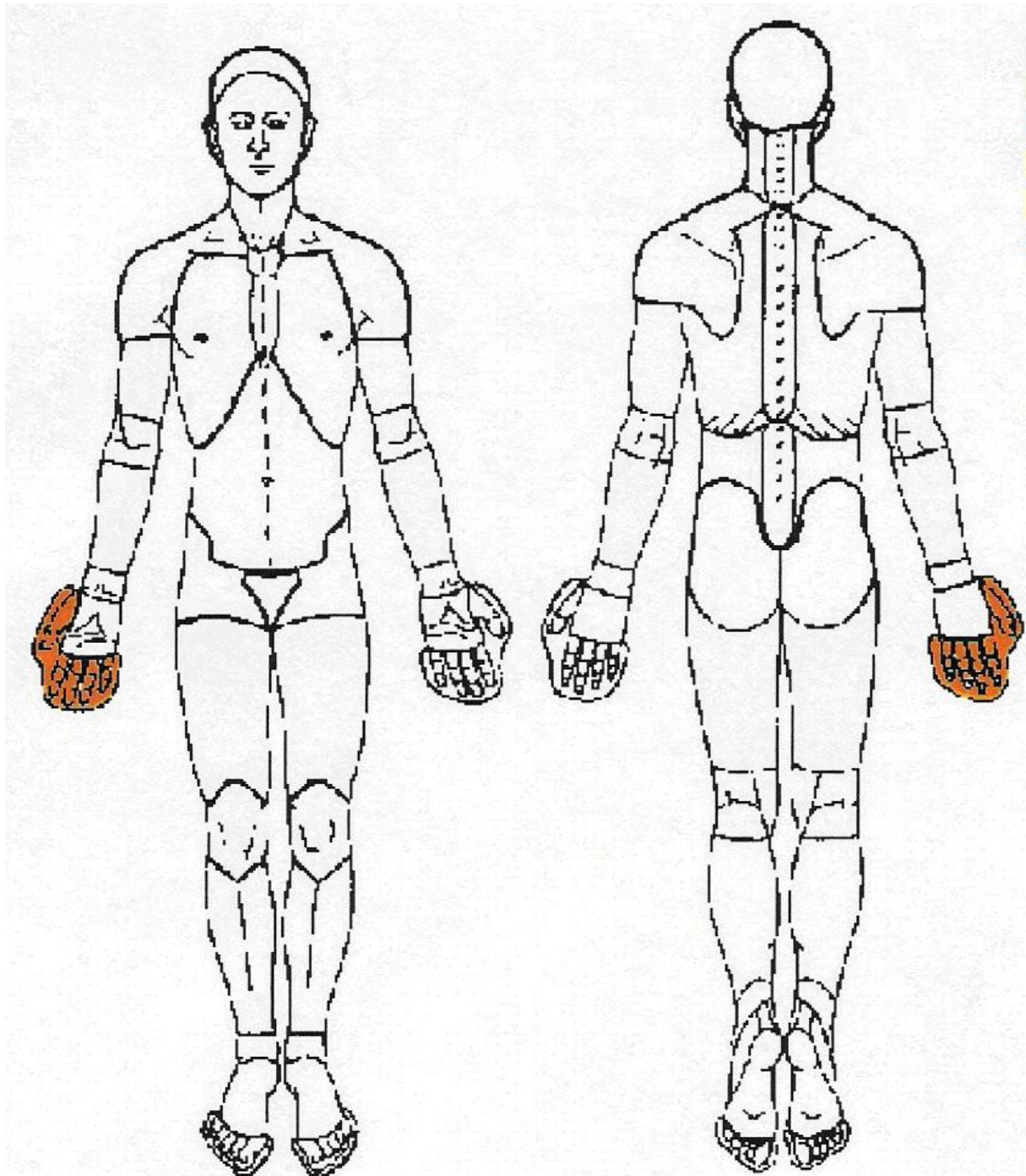
Possible codes for the injuries are noted below.
    i.   Wound

    ii.   Crushed/pinched

    iii.   Fracture

    iv.   Injury to internal organ

    v.   Other

The IFJ data posted to the crash database will be handled by the investigators or by the crash data reviewers in order to associate the information with the person entries existing in the crash data forms.

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Other Data Elements

The crash records and the injury / fatality journals contain data that make references to the external entities like cities, police stations, users, and hospitals. These external entities can be managed by the database management system which is primarily accessed by the crash database application or by completely different set of applications which are loosely coupled with the crash database application through use of technologies like web services.

Regional offices / police stations

The regional offices / police stations (sometimes referred to as "police units") will be represented as data units that contain following elements.

- Type (regional office or police station)

- Name

- Contact person

- Address

- Telephone numbers

- Fax numbers

- City/municipality/district

- Active / inactive status

- Superior police unit (applicable only to the police stations)

The Georgian Police can establish new police units or close existing ones. It is system administrator's responsibility to keep the list of "active police units" in sync with the real situation.

Cities / municipalities / districts

The system contains the hierarchical representation of Georgia's administrative divisions. Each administrative division entity reachable by the police stations must be registered by the crash database. Followings elements will be registered by the system.

- Name

- Superior administrative division (not applicable for the top level administrative division)

The police stations and the hospitals make reference to the administrative divisions.

Hospitals

The system holds a registry of the hospitals which are obliged to post information about casualties. Hospitals are not required to send accident identifiers which may not be known at the time of reporting. For each hospital following elements will be recorded.

- Name

- Contact person

- Address

- Telephone numbers

- Fax numbers

- City/municipality/district

- Active / inactive status

Users

The users of the system will be maintained by an external system that has been maintained by the IT department of the Ministry of Internal Affairs. The relevant user information will be made available to

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the crash database application through the "user management web services" that will be tailored according to the needs of the crash database application. In this respect, followings will be possible.

Crash Database Application Specifications

1. Hardware specifications

   Currently, the transaction volume per year for the crash database application is at the level of 10000, which does not exceed the 30 crash records per day. Number of the IFJ's per day and number of crash record printings per day will not cause any increase that is meaningful to change the low processing power needed. Additional processor power will be needed for generation of statistical tables. The specification given here should be interpreted as minimum.

   1.1. The system will require two quad-core CISC processors running at clock frequency of 2 GHz, having 4 MB cache. One of the processors if for running the application and the statistical analysis tool. The other is for running the database server.

   1.2. There should be 2 GB RAM per each processor.

   1.3. 160 GB disk space for crash data.

   1.4. 80 GB disk space for installation of the application, and the off the shelf products that may be needed.

2. Network specifications

   2.1. Network interconnections

      2.1.1. The network connections that should be supplied for the crash database are listed below.

         2.1.1.1. A VPN connection between the Roads Department and the Ministry of Internal Affairs network to enable the GIS integration.

         2.1.1.2. A VPN connection between the Ministry of Justice and the Ministry of Internal Affairs network to enable criminal case verification.

         2.1.1.3. An Internet Connection to handle the incoming requests from the hospitals.

      2.1.2. The supplier will define precisely how the network connections will be established and terminated.

   2.2. The network segments of the application server and the database server will be separated. The access from the application server to the database server will be only through the ports designated for the data services.

3. Software specifications

   3.1. Functional specifications

      3.1.1. The crash database application will meet all of the functional requirements stated in functional design.

   3.2. Architecture and integration

      3.2.1. The crash database application will be compliant with 3 tier architecture.

      3.2.2. The crash database application will be capable of serving external applications by the web services.

      3.2.3. The crash database application will be capable of using external applications by the web services.

      3.2.4. The crash database application will be capable of connecting to the external databases through wide variety of data connection libraries like ODBC, JDBC, or native drivers.

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3.3. Language and localization

3.3.1. The crash database application will be capable of registering, sorting, and applying case conversion and comparison by the rules of Georgian language.

3.4. User interface and ergonomics

3.4.1. The crash database application will be accessible through web browsers.

3.4.2. The user interface of the application will present to the users with industry standard user interface items like but not limited to input boxes, date entry boxes, radio buttons, checkboxes, buttons, and hyperlinks.

3.4.3. In response to a user action, the crash database application will create as many warnings and error messages as possible in order to reduce the time required to edit data.

3.5. Security

3.5.1. The crash database application will respond to its users through comprehensive access control. None of the responses will be generated without provision of access control.

3.5.1.1. User management and authentication will be developed by using the specific web services that have been maintained by the IT department of the Ministry of Internal Affairs.

3.5.1.2. Form authentication for the application will be applied.

3.5.1.3. Additional authorization data like the relation between the users and the districts will be handled on the application side without imposing extra load to the user management and authentication services supplied by the Ministry of Internal Affairs IT department.

3.5.2. The communication between the clients and the server will be done in a secure way at the minimum strength of SSL 3.0 or equivalent. When supplied by the beneficiary, it will be possible to install and activate the security components such as certificates to enable the line security.

3.6. Help and support

3.6.1. The pages generated with by the crash database application will be accompanied by descriptive pages that will become visible upon the user's request.

3.7. Data design requirements

3.7.1. The data design will enforce use of relational constraints for generation of proper and consistent data.

3.7.2. The design will be suitable for implementation on relational database management systems.

3.7.3. The crash database application will have features to implement the consistent data where capabilities of relational database management system are short or not preferable.