

BUILDING THE CZECH ROAD SAFETY OBSERVATORY

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Abstract

The main purpose of SENZOR project is to improve road safety in the Czech Republic by supporting the effective decision making processes regarding safety countermeasures on all state levels – national, regional and local – with help of the information and data obtained from the Czech Road Safety Observatory (CZRSO). CZRSO consists of informative part and data part. Centrum dopravního výzkumu, v.v.i. (Transport Research Centre), which coordinates SENZOR project, is one of major cooperants of SafetyNet (EU FP6 programme), which puts Czech Republic near the realization of mentioned objective. The paper describes SENZOR and CZRSO and focuses on data part with Safety Performance Indicators (SPIs). In the end, progress of selected SPIs (speed, seat belts and daytime running lights) on Czech roads is discussed.

Keywords: road safety, safety performance indicators, speed, seat belts, daytime running lights

1. Introduction of SENZOR

Project SENZOR is entitled „Building of the Czech Road Safety Observatory“ (CZRSO) [1]. The project is funded by Czech Ministry of Transport within a research programme for years 2005 to 2009. The Czech Road Safety Observatory has been developed together with European Road Safety Observatory (ERSO) [2] with support of Czech Ministry of Transport and European Commission, which ensures the comparability of Czech data on European level. Project is coordinated by Centrum dopravního výzkumu, v.v.i. (Transport Research Centre).

Sufficient road safety is important characteristic of developed society. High accident rate is both medical and social issue and it even brings high social-economical losses, which have been calculated to be about 50 billions CZK in every year in last ten years. The negative effect of accidents on traffic flow (congestions, traffic fluency) and environment are not calculated in this sum. Until 1985, the Czech Republic had been quite successful in tackling the road safety problems, but since second half of 1980s, the positive trend has dramatically changed and the Czech Republic has become one of the worst countries regarding road safety in Europe. All relevant decision makers, but even common people should try to do the best to solve this unflattering situation and bring the Czech Republic back between the countries with high level of road safety.

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2. Main tasks of establishing of CZRSO

The project is divided into 5 parts, which are influencing each other:

- WP1 – Compatibility of Czech accident data with CARE (European Road Accident Database)
- WP2 – Methodology of collection, storage and analyse of SPIs (Safety performance indicators) on national, regional and local level. Methodology has to be compatible with the EU one developed in Safety Net project.
- WP3 – Start of regular collection of SPIs, their storage and basic analysis on national level
- WP4 – Establishing the informative part of the CZRSO
- WP5 – Launch of Czech Road Safety Observatory for public use

3. Compatibility of Czech accident data with CARE

This topic is solved within WP1. The main goal is to achieve the compatibility of the Czech Police accident database with CARE database (European Road Accident Database) [3]. CARE has been created and administrated by European Commission DG-TREN.

The transition rules are being processed within the EU FP6 project SafetyNet [4] for most of the new member states. Some of the states have already been put into the CARE database, for the rest of states the transition rules are in the stage of checking their functionality. The transition rules for the Czech Republic were created in 2007 and were sent to DG-TREN to be tested. The first set of detailed data for year 2006 was send to DG-TREN in the end of 2007.

4. Czech Road Safety Observatory

The Czech Road Safety Observatory consists of two related, but independent parts:

- Informative part (developed in WP4 and WP5)
- Data part (developed in WP2 and WP3)

4.1 Informative part

The establishing of CZRSO is one of the measures, which has been agreed by EU countries' ministers of transport together with the states from EEA and EFTA: support the establishing of the European Road Safety Observatory as an internal body of European Commission. On their meeting in autumn 2003, the ministers expressed their interest: "...to conduct analyses based on comparable data and to disseminate the results of these analyses to research institutes, local bodies and public with respect to the private protection laws".

There are several databases in the Czech Republic, which are somehow related to the road safety. Besides the basic accident database of the Czech Police, there are lists of sections with higher risk of accident (prepared by the road authorities) and databases operated by Ministry of Transport and Ministry of Health. However, the use of these databases for road safety work and analyses is limited. The non-existence of a central uniform database of data and knowledge, which could be accessible for all relevant bodies, is seen as a big problem.

Such joint database is necessary groundwork for implementation of the most effective road safety measures. It can even serve as a data source for further evaluations of measures' real

effectivity. Although there are such databases abroad, we can declare this action as European without exaggeration. EU FP6 project SafetyNet which started in 2004, puts us near the realization of this objective. Transport Research Centre (CDV), which coordinates SENZOR project, is one of major cooperants of SafetyNet. CDV is involved in many working groups and has a strong influence on creation and development of CZRSO.

In beginning of CZRSO, Dutch information database RSIS was taken as an example. RSIS was created by SWOV (Dutch national road safety research institute) and for many years it has served as a knowledge base for decision makers in road safety area at all administration levels. RSIS database system features proved competent and it became a model for ERSO.

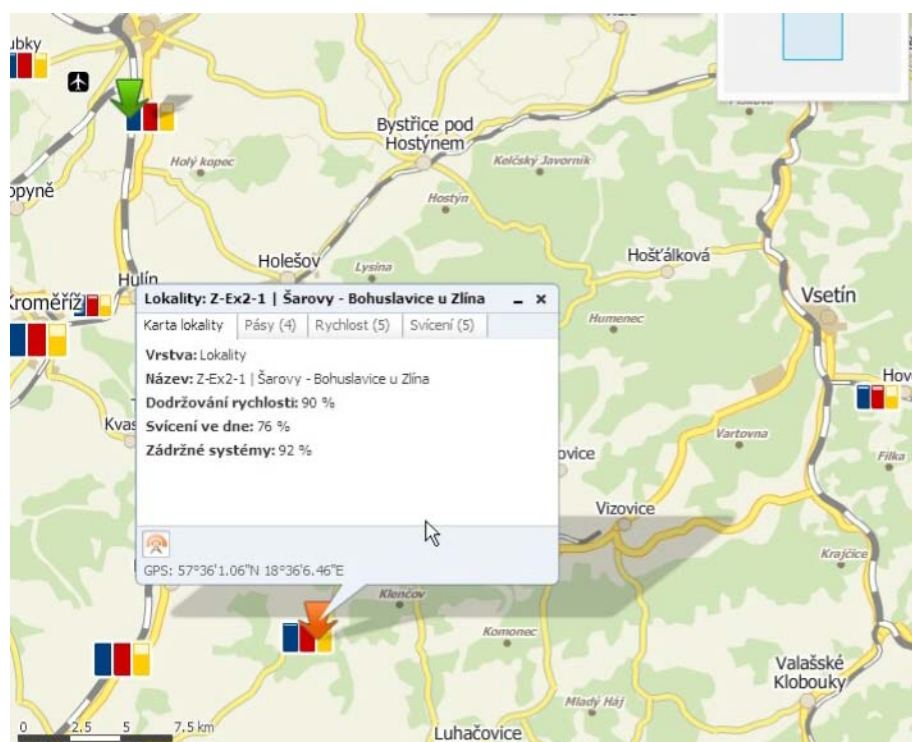
By the end of 2007, CZRSO was launched for first test users. During this test phase, CZRSO is being tested and debugged so that it works the best for all potential future users. All the data are continuously updated with articles, charts, tables... and above all with data from actual measurements and observations.

4.2 Data part

Information sources for data part (ie. knowledge base) are mainly Czech Police and Czech Road and Motorway Directorate – these data give information on road network and safety performance indicators (SPIs), which are gathered within the SENZOR project. SPIs are as follows: speed, seat belt use and DRL use. There is a direct and quantitative relation between indicator's value and amount of issue in relevant area; so there is a relation between its amount and steps undertaken in time.

The data part is grounded on an extensive database of measurement which combines data obtained in SENZOR but also in other CDV's projects and activities. All the data contained are geographically linked together by GPS coordinates. As a result, all the data outputs can be visualized in map application VectorMap (created by CDV – see Figure 1).

Figure 1: Example of VectorMap seat belt use data visualization: colour bars represent number of drivers, front seat passengers and rear seat passengers.



5. Methodology of collection, storage and analyse of SPIs

Safety Performance Indicators [5] are the indicators, reflecting those operational conditions of the road traffic system, which influence the system's safety performance.

The purpose of SPIs is:

- to reflect the current safety conditions of a road traffic system (ie. they are considered not necessarily in the context of a specific safety measure, but in the context of specific safety problems or safety gaps);
- to measure the influence of various safety interventions, but not the stage or level of application of particular measures;
- to compare different road traffic systems (eg. countries, regions, etc).

A Safety Performance Indicator is any variable, which is used in addition to the figures of crashes or injuries to measure changes in the operational conditions of road traffic. SPIs can give a more complex picture of the level of road safety and can detect the emergence of problems at an early stage, before these problems result in crashes. They use qualitative and quantitative information to help determine a road safety programmes' success in achieving its objectives.

In 2001, ETSC has defined SPIs as follows:

- Alcohol and drugs
- Speed
- Restraint systems
- Daytime running lights
- Vehicle
- Roads
- Trauma management

In CZRSO, selected SPIs are monitored:

- Speed
- Use of restraint systems (seat belts and child restraint systems)
- Daytime running lights
- Safety gaps between vehicles
- Mobile phone use

CDV was responsible for proposal of European methodology of seat belt use and child restraint systems monitoring. This objective was fulfilled as one of the first in this part of SafetyNet project and this methodology has been considered a model for other SPIs.

6. SPIs observed in EU countries

Table 1 gives an overview of data availability and usability. For each country and indicator area the table indicates whether or not data are available and whether these data are suitable to calculate SPIs.

Table 1: Data availability and usability [7]

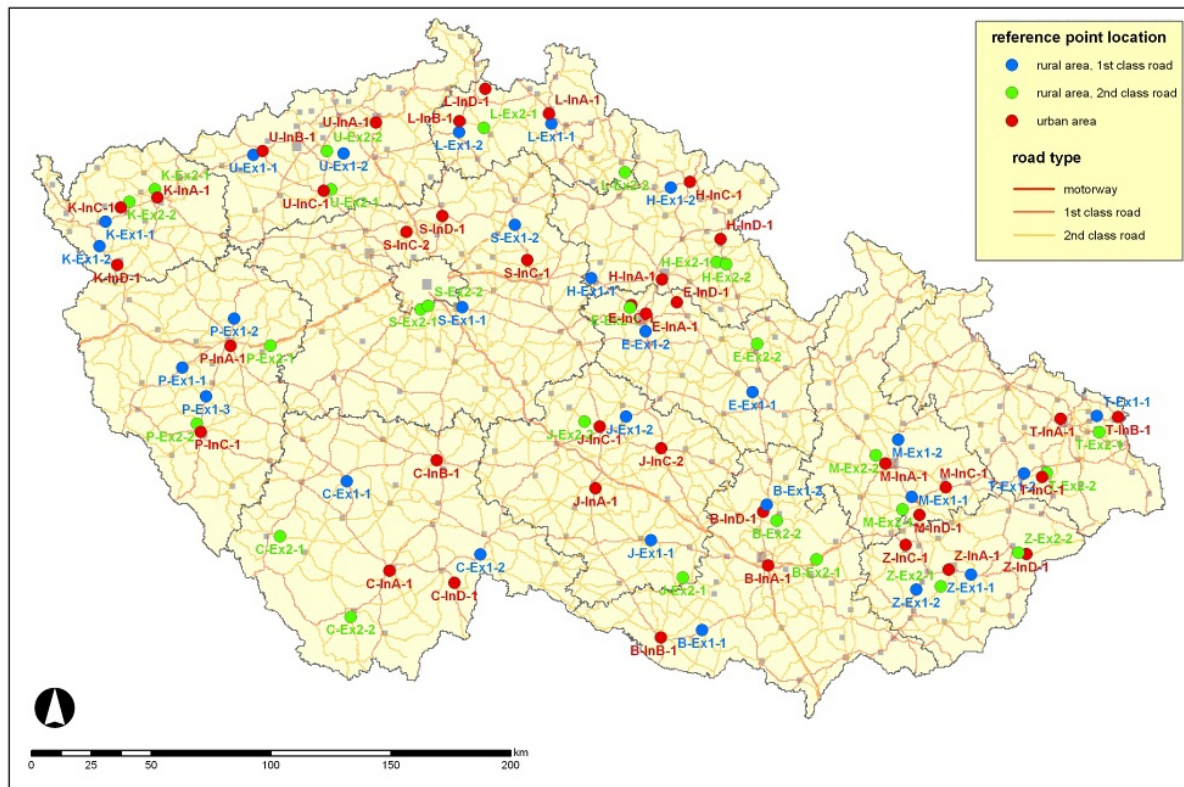
Country Name	Country code	Alcohol and drugs	Speed	Restraint systems	Daytime running lights	Vehicle	Roads	Trauma management
Belgium	BE	+	+	+	-	+	+	+
Czech Republic	CZ	+	+	+	+	+	+	+
Denmark	DK	+	+	+	-	+	+	+
Germany	DE	+	-	+	-	+	~	+
Estonia	EE	+	+	+	+	+	+	+
Greece	EL	+	-	-	-	+	+	+
Spain	ES	+	~	+	-	+	+	-
France	FR	+	+	+	+	-	-	-
Ireland	IE	-	+	+	-	-	-	-
Italy	IT	+	-	+	-	~	-	-
Cyprus	CY	+	~	-	-	+	+	+
Latvia	LV	+	~	+	-	+	~	+
Lithuania	LT	+	-	-	-	-	-	-
Luxembourg	LU	-	-	+	-	-	-	-
Hungary	HU	+	+	+	+	+	+	+
Malta	MT	-	-	+	-	+	~	+
The Netherlands	NL	+	+	+	+	+	+	+
Austria	AT	+	+	+	+	+	~	+
Poland	PL	+	+	+	-	~	~	-
Portugal	PT	-	+	+	-	~	+	~
Slovenia	SI	-	-	~	-	-	-	-
Slovakia	SK	+	-	-	-	-	-	+
Finland	FI	+	+	+	+	-	-	-
Sweden	SE	+	~	+	-	+	+	+
United Kingdom	UK	+	+	+	-	+	-	+
Norway	NO	+	+	+	-	+	+	+
Switzerland	CH	+	+	+	+	~	-	-

+	data available, and can be used for the calculation of SPIs
~	data available, but not suitable for the calculation of SPIs
-	no data available

For the most possible precision at SPIs monitoring, national reference points network was established. At these points, monitoring has been performed periodically since 2005 within SENZOR project. Points are organised as follows:

- Each of 13 regions has 7 points:
 - 2 points on 1st class road
 - 2 points on 2nd class road
 - 3 points on urban roads
- Totally 91 points in the Czech Republic:
 - 26 points on 1st class road
 - 26 points on 2nd class road
 - 39 points on urban roads

Figure 2: Czech national reference points network [1]



All the measurements and observations are performed in week days with typical traffic flow:

- Monday to Thursday
- 7 to 17 o'clock
- March to July or September to November

The duration of observation at one reference point takes minimally 4 hours. Monitoring is performed visually or with measuring technology (eg. speed). Results of visual observations are registered into special field forms.

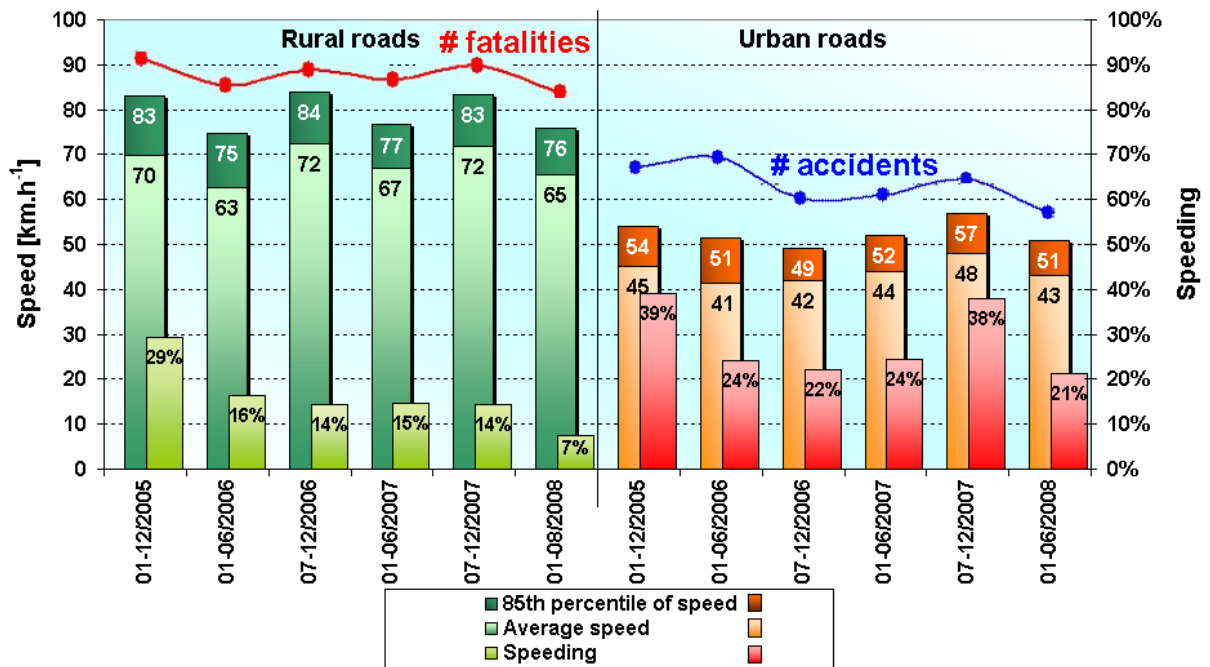
7. Results of observation

To show the value and use of data in CZRSO, following example charts were produced. They cover the years 2005 to 2008 and present the progress of SPIs (speed, seat belt use and daytime running lights) in half-years. Progress also reflects effect of launch of penalty point system, introduced with change of Road Act in July 2006.

7.1 Speed

After July 2006, both speed and speeding in rural areas increased. Fortunately, level of speeding did not reach the values of year 2005 – thus campaigns were successful. Situation in urban areas is similar to rural areas. Before 2006, level of speeding decreased. Even bigger decrease happened after July 2006. Unfortunately, it seems that since second half-year of 2007 drivers have been losing respect to police control and values of speed even exceeded values of year 2005. However, in 2008 values correspond to year 2006 again.

Figure 3: Speed (average and 85th percentile) and speeding on rural and urban roads (half-years 2005 – 2008) [1]



Further, we have discovered correlation between speed on rural roads and number of fatalities (red line in Figure 3). Similarly, there is a correlation between speed on urban roads and number of accidents (blue line in Figure 3). It documents influence of speed on real numbers of accidents and fatalities.

7.2 Seat belt use

Seat belt use is another important SPI – it includes information on using seat belts and child restraint systems.

Figure 4: Use of seat belts on urban roads (half-years 2005 – 2008) [1]

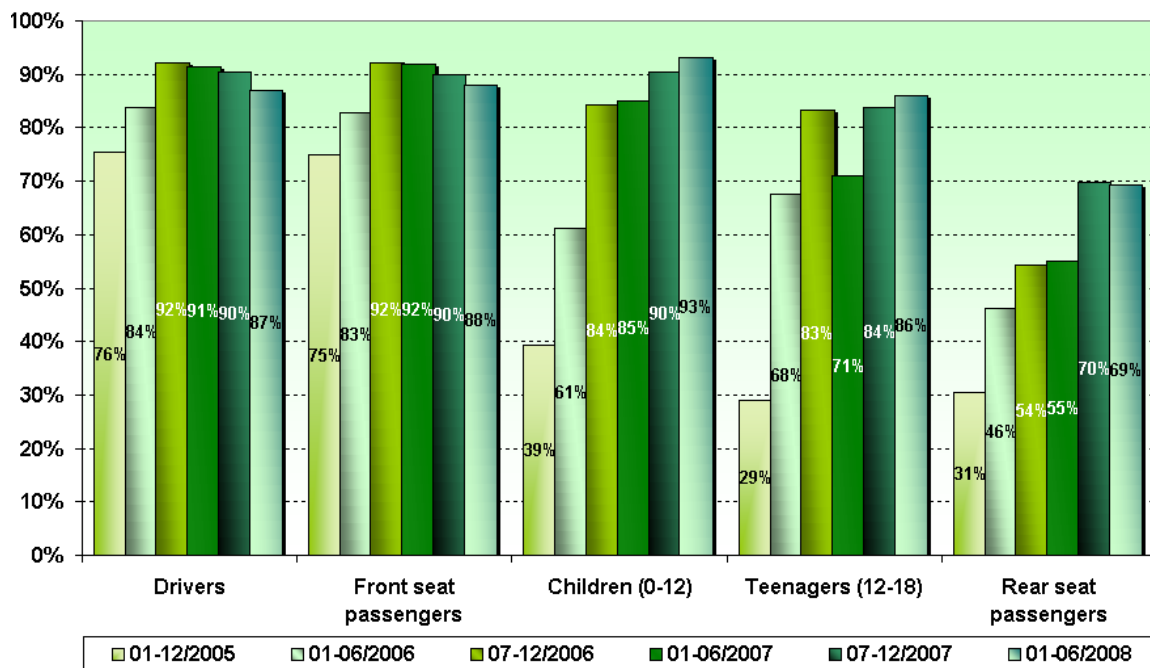
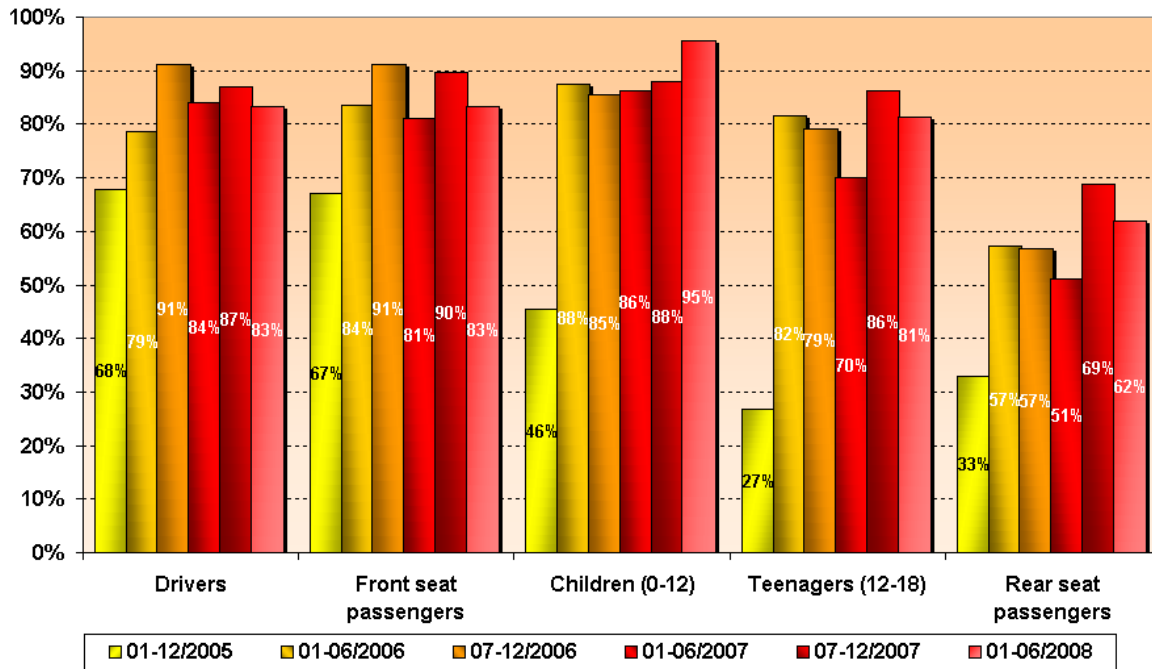


Figure 5: Use of seat belts on rural roads (half-years 2005 – 2008) [1]

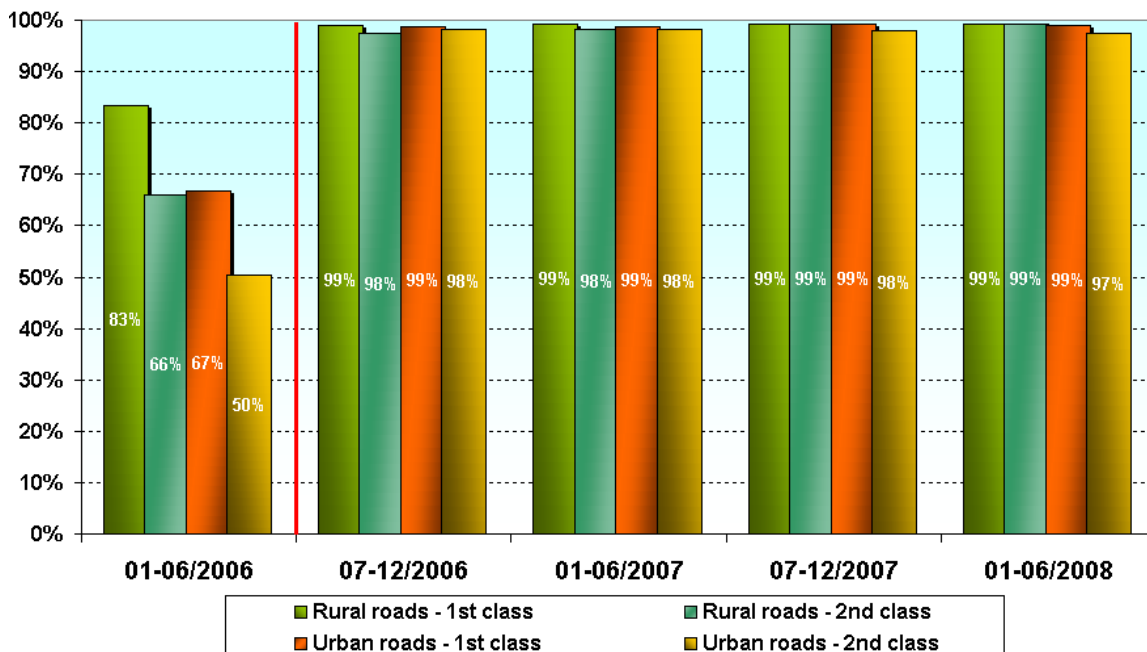


Values show that even prior to launch of point penalty system, there was a positive trend in seat belt use. During 2006, values were rising; however they are still very low. Drivers and passengers still try to avoid using seat belts, mainly on rear seats. In spite of all the changes, values in 2008 are still higher compared to years before the change of Road Act.

7.3 Daytime running lights

Up to 1st half-year of 2006, daytime running lights (DRL) use was optional; since 1st of July 2006 it is compulsory. In 2nd half-year of 2006, DRL use increased heavily up to 98 – 99 %. Evidently, drivers quickly got used to use DRL regardless of road type. In 2007, DRL use increased even slightly more – since then values have not fallen below 98 – 99 %.

Figure 6: Use of daytime running lights (half-years 2006 – 2008) [1]



8. Summary

Progress of Safety Performance Indicators shows the value of these data. We can see correlation between accident rate and speed or estimate effect of road safety campaigns. Czech Road Safety Observatory, as a knowledge base of road safety related information and data, can be thus considered a functioning tool which meets the primary objective of SENZOR project. With continuing effort and further improvements, we are able to create complex and high-quality knowledge base, gathering all the information and data on road safety, which can be used for everyday decision making on road safety improvement and measures implementation in the Czech Republic through all administration levels.

References

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