PROJECT

SELCAT

Safer European Level Crossing Appraisal and Technology

Funding: European (6th RTD Framework Programme)
Duration: Sep 2006 - Dec 2008
Status: Complete with results
Total project cost: €1,255,016
EU contribution: €1,255,016

Call for proposal: FP6-2005-TRANSPORT-4
CORDIS RCN: 81521

Background & policy context:

Every year, more than 330 people are killed in more than 1,200 accidents at road-rail level crossings in the European Union. Together with tunnels and specific road black spots, level crossings have been identified as being a particularly weak point in road infrastructure, seriously affecting road safety. In the case of rail transport, level crossings can represent as much as 50% of all fatalities caused by railway operations.

Up to now, the only effective solution appears to involve upgrading level crossing safety systems even though in more than 90% of cases the primary accident cause is inadequate or improper human behaviour rather than any technical, rail-based issue. High safety requirements for level crossing systems required in European railway sector standards create a high cost hurdle which hinders the technological upgrade of existing systems. Railway standards already include a risk based definition of safety, according to which only unacceptable levels of risk must be eliminated by the technical system. Nevertheless, the lack of an approved common safety methodology which would allow the industry to quantify the risk to be reduced still leads to the imposition of the highest safety integrity levels for technical solutions in most European countries.

To date the fact that level crossings are directly involved in only a very small proportion of road accidents has limited the involvement and commitment of the road sector in developing solutions to the problem. It is expected that this project will help improve the level of engagement of road traffic engineers and policy makers throughout the European Union, leading to the identification of better and smarter solutions and investments designed to facilitate their implementation.

Objectives:

The SELCAT Co-ordination Action (Safer European Level Crossing Appraisal and Technology) aimed to contribute to the reduction of level crossing accidents by the:

- collection, analysis and dissemination of existing research results and the stimulation of new knowledge exchange in the area of level crossing safety;
- creation of circumstances whereby European partners, in the rail and road sectors, can make a significant contribution to the reduction of accidents, injuries and fatalities at level crossings;
- understanding and codifying of existing and planned research;
- comparison and harmonisation of data sources;
- exploration of new technologies and harnessing of appraisal techniques to optimise these.

It was expected that the activities of SELCAT would lead directly to the improvement and expansion of intermodal collaboration between the road and rail sectors.

In accordance with the European Commission's White Paper on European Transport Policy, SELCAT contributed to the investigation of new technologies for improved road and rail safety and to the implementation of the objectives of the Strategic Rail Research Agenda (SRRA) of the European Rail Research Advisory Council (ERRAC) by focusing on the reduction of fatalities, the methodology of
common risk assessment and the process of cost benefit analysis.

Addressing safety methods, safety targets and indicators in connection with cost benefit analysis. SELCAT also harmonised with the aims of the work programme of the European Railway Agency (ERA). A key objective of SELCAT was to evaluate the safety performance of European level crossings and to make recommendations on the common safety targets for this particular sub-system of railway transport. In addition, as a practical example, the level crossing will be used to provide a benchmark for the application of evaluation methodologies and can be used as an important contribution to the adoption of the Common Safety Methods planned by ERA for implementation in 2008.

In order to reach the above scientific and technological objectives and taking into account the current problems described, SELCAT carried out co-ordination activities to:

- provide a knowledge base for the improvement of level-crossing safety by carrying out an analysis of the results of those safety-related projects included in FP5 and FP6 relevant to Railway and Road Transport;
- provide an overview of existing and planned level crossing res

**Methodology:**

**Co-ordination activities**

All the co-ordination activities were focused on the increase of level crossing safety addressing all possible influencing factors.

The first factor was learning from the current 'state of the art' including an overview of the present status of level crossing accidents statistics and the research completed during FP5 and FP6 relevant to the areas of rail and road transport safety (WP1). The second influencing factor was an examination of advanced technologies which could be applied to decrease the number of level crossing accidents (WP2).

The third critical factor is the need to understand how well expenditure on level crossing upgrades is aligned to operational risk evaluation, system safety, performance and cost-benefit analysis overall (WP3). WP3 methodology applied the results of WP1 (level crossing accident statistics) and WP2 (level crossing technical solutions), but could also be applied to the investigation and design of any other safety critical transport control system.

**Dissemination activities**

This activity involved three workshops to disseminate the results from recent selected FP5 and FP6 projects and promote participation in the FP7. These workshops will underpin the dissemination activities and facilitate networking between participants. Face-to-face meetings of those directly involved in level crossing safety is necessary to create lasting collaboration between people and organisations with different backgrounds.

The creation of the 'Level Crossing Web portal' should result in the broad dissemination of safety and level crossing related research activities investigated by the SELCAT Project.

**Parent Programmes:**

**FP6-SUSTDEV-3 - Global Change and Ecosystems**

**Institute type:** Public institution

**Institute name:** European Commission

**Funding type:** Public (EU)

**Lead Organisation:**

**Technische Universitat Braunschweig**

**Address:**
Pockelstrasse 14
3329 BRAUNSCHWEIG
Germany

**Organisation Website:**
http://www.tu-braunschweig.de

**EU Contribution:** €0
Partner Organisations:

Universita Di Roma "la Sapienza" - Dipartimento Idraulica Trasporti E Strade

Address:
Via Eudossiana, 18
ROMA
Italy

Organisation Website:
http://w3.uniroma1.it/dits/homepage.html

EU Contribution: €0

University Of Zilina In Zilina

Address:
Univerzitna 1
ZILINA
Slovakia

Organisation Website:
http://www.utc.sk

EU Contribution: €0

The University Of Birmingham

Address:
Edgbaston
Birmingham
B15 2TT
United Kingdom

Organisation Website:
http://www.bham.ac.uk

EU Contribution: €0

Todor Kableshkov Higher School Of Transport

Address:
Geo Milev 158
SOFIA
Bulgaria

Organisation Website:
http://www.vtu.bg

EU Contribution: €0

Union International Des Chemins De Fer

Address:
16 rue Jean Rey
75015 PARIS
France

Organisation Website:
http://www.uic.asso.fr

EU Contribution: €0
<table>
<thead>
<tr>
<th>Organisation</th>
<th>Address</th>
<th>Organisation Website</th>
<th>EU Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rail Safety And Standards Board</td>
<td>Evergreen House, 160 Euston Road LONDON United Kingdom</td>
<td><a href="http://www.rssb.co.uk">http://www.rssb.co.uk</a></td>
<td>€0</td>
</tr>
<tr>
<td>Centrum Naukowo - Techniczne Kolejnictwa</td>
<td>Chlopickiego 50 WARSZAWA Poland</td>
<td><a href="http://www.cntk.pl">http://www.cntk.pl</a></td>
<td>€0</td>
</tr>
<tr>
<td>Technical Research Centre Of Finland</td>
<td>Vuorimiehenite 3 1000 ESPOO Finland</td>
<td><a href="http://www.vtt.fi">http://www.vtt.fi</a></td>
<td>€0</td>
</tr>
<tr>
<td>Multitel</td>
<td>parc Initialis, avenue Copernic 1 MONS Belgium</td>
<td><a href="http://www.multitel.be">http://www.multitel.be</a></td>
<td>€0</td>
</tr>
<tr>
<td>Network Rail Infrastructure Limited</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
40 Melton Street  
LONDON  
United Kingdom  

**Organisation Website:**  
http://www.networkrail.co.uk  

**EU Contribution:** €0  

---  

**Deutsche Bahn Ag**  

**Address:**  
Postdamer Platz 2  
10785 BERLIN  
Germany  

**Organisation Website:**  
http://www.deutschebahn.com  

**EU Contribution:** €0  

---  

**Rete Ferroviaria Italiana**  

**Address:**  
Piazza Della Croce Rossa  
161 Roma  
Italy  

**Organisation Website:**  
http://www.rfi.it  

**EU Contribution:** €0  

---  

**National Company "railway Infrastructure"**  

**Address:**  
Maria Louisa Blvd. 110  
SOFIA  
Bulgaria  

**Organisation Website:**  
http://www.rail-infra.bg  

**EU Contribution:** €0  

---  

**Hungary Railway Capacity Allocation Office**  

**Address:**  
Terez Krt. 62  
BUDAPEST  
Hungary  

**Organisation Website:**  
http://www.vpe.hu  

**EU Contribution:** €0  

---  

**Federal State Unitary Enterprise All-Russian Railway Research Institute**  

**Address:**  
3-d Mytishchinskaya st., 10  
MOSCOW  
Russia  

**Organisation Website:**
<table>
<thead>
<tr>
<th>Organisation</th>
<th>Address</th>
<th>Organisation Website</th>
<th>EU Contribution</th>
</tr>
</thead>
</table>
| Ecole Mohammadia D'ingenieurs' | avenue Ibn Sina  
BP 765 rt agdal RABAT  
Morocco | http://www.emi.ac.ma | €0 |
| Office National De Chemin De Fer | 8 bis, Rue Abderrahmane El Ghafiki-Rabat-Agdal  
RABAT  
Morocco | http://www.oncf.ma | €0 |
| Research Design And Standards Organization | RESEARCH DESIGN AND STANDARDS ORGANIZATION COLONY  
LUCKNOW  
India | http://www.rdso.gov.in | €0 |
| China Academy Of Railway Science | Daluishu Road, No. 2 HaiDian District  
BEIJING  
China | http://www.rails.com.cn/ | €0 |
| Allgemeiner Deutscher Automobil - Club E. V. (Adac E.v.) | Am Westpark 8  
81373 MUNCHEN  
Germany | | €0 |
| Deutsches Zentrum Fr Luft Und Raumfahrt E.v | | | |
Key Results:

During the project duration the following main achievements were recorded:

- Creation of a widely accessible SELCAT level crossing web portal populated with more than 200 level crossing related documents and country specific statistics covering more than 10,000 level crossing accidents related to 70 national specific level crossing types.
- Structured overview of nine European and 70 national funded projects dealing with level crossing risk appraisal and safety performance monitoring in the rail and road sectors in relation to level crossings.
- Comparison of the existing level crossing risk made, based on national accident statistics of 13 countries.
- Results of analysis of level crossing related legislation involving eight SELCAT member countries.
- Development of a generic functional level crossing model allowing the investigation of operational and safety impacts related to the introduction of new technologies.
- A structured overview of 40 projects dealing with the application of advanced level crossing technology for level crossing risk reduction.
- Recommendations on the promotion of awareness of level crossing users and organisations based on the identification of mutual information gaps.
- Proposal for a future level crossing safety system involving advanced technology of radio communication and train positioning.
- Overview and classification of worldwide approaches of level crossing risk evaluation methods.
- Results of analysing the appropriate scaling factors applicable for the comparison of level crossing accident statistics.
- Implementing scaling factors into the SELCAT level crossing web portal to allow for the comparison of individual and societal level crossing accident risk (in accordance with the European Rail Safety Directive) applicable for level crossing safety performance monitoring.
- Overview of cost benefit analysis methodologies including exemplar application on obstacle detection technology.
- Preparation and publication of a proposed European Strategy for the reduction of risk at the road/Rail interface.

Policy implications

The SELCAT consortium was created to study the background of level crossing accidents and the potential to effectively reduce operational risks for road and rail transport and their users. Level crossing safety is one of the challenges for improving safety in both sectors. The approach chosen is comprehensive in the sense that it includes aspects ranging from sensing and actuation, to reasoning, learning and reflection.

Addressing safety methods, safety targets and indicators in connection with cost benefit analysis, SELCAT also harmonises with the aims of the work programme of the European Railway Agency (ERA). Overall, the coordinating activities of SELCAT will contribute to the practical implementation of the Safety Directive of the European Parliament, which prescribes a wide range of new duties for the various stakeholders in railway transport.

One of the direct results of recent activities is the passing of a resolution in February 2008 for the development of a Road/Rail Interface Strategy for Europe. The motivation, idea, role, core elements of the strategy and benefits of the establishment have been outlined with the aim to carry on with the
Readiness

Evaluating results and recommendations from the work packages has identified two areas with the potential for standardisation in the future.

The first item is based on the evaluation of level crossing legislation (WP1) during which it was realised that there are significant differences in road driver responsibilities between the Member States. In particular the legislation of Eastern European countries requires the full personal responsibility of the road vehicle driver for their safe passage at level crossings. This applies even where that the level crossing is equipped with a safety system (such as warning lights or barriers). On the other hand in the majority of Western European countries the road vehicle driver can rely fully on the functioning of the safety system (where provided) and therefore does not need to be aware of an approaching train if this system is not activated (where the warning lights are not activated or the barriers are open).

The second item concerns the evaluation of the level crossing risk. In order to provide similar safety conditions at all European level crossings it is sensible to harmonise risk assessment methodologies. Based on the conclusion that the statistically oriented risk modelling identified by SELCAT is the best risk assessment methodology, this should be widely adopted.

Careful attention should be paid to the common set of information collected about level crossing operational conditions and on accidents which have occurred in the past. Such a list of relevant information could be the source of future European standards concerning the monitoring of level crossing safety performance.

Documents:

- Recommendations for FP 7 Activities (Other project deliverable)

STRIA Roadmaps: Other specified

Transport mode: Multimodal transport

Transport sectors: Passenger transport, Freight transport

Transport policies: Safety/Security

Geo-spatial type: Network corridors