**PROJECT**

**MODSafe**

**Modular Urban Transport Safety and Security Analysis**

**Funding:** European (7th RTD Framework Programme)

**Duration:** Sep 2008 - Aug 2012

**Status:** Complete with results

**Total project cost:** €5,180,841

**EU contribution:** €3,469,161

**Call for proposal:** FP7-SST-2007-RTD-1

**CORDIS RCN :** 92875

**Background & policy context:**

The European Urban Guided Transport sector is still characterised by a highly diversified landscape of Safety Requirements, Safety Models, Responsibilities and Roles and Safety Approval, Acceptance and Certification Schemes. While a certain convergence in architectures and systems can be observed (e.g. through other R&D projects like MODURBAN) the safety life-cycle still differs from country to country and sometimes even within one country.

Furthermore security items are considered more and more as vital for the urban transport sector. In some cases these items are linked to the safety of the urban transport systems. In this context safety is seen as everything dealing with the methods and techniques to avoid accidents. Security is concerned with the protection of persons and the system from criminal acts.

In contrast to the Mainline Railway Domain, where European CENELEC Standards such as EN 50126, 50128 and 50129, European Research Projects and Networks like SAMNET or SAMRAIL and finally the establishment of European Railway Agency in Valenciennes have helped and are still helping to streamline the safety sector, the urban guided transport sector is only in some aspects (through the application of the relevant CENELEC standards) participating in this harmonisation development. In some other respects, the urban situation is even getting more difficult and challenges for the ultimate responsible, the operators and industries, are rather increasing.

The EU Commission reacted to these challenges of their member state's urban transport operators and industries by requesting the establishment of a Safety Analysis and Model Reference for the future for Urban Guided Transport projects.

MODSAFE therefore set out to define agreed safety requirements for the safety related functions of an urban guided transport system. In order to achieve such a safety requirements allocation it was necessary to construct a functional and Object Safety Model of an urban guided transport system.

**Objectives:**

MODSAFE aimed to provide for the first time a coherent and agreed Hazards Analysis and Risk Analysis together with a definition of agreed safety requirements for the safety related functions of an urban guided transport system.

In order to achieve such a safety requirements allocation it was necessary to construct a functional and Object Safety Model of an urban guided transport system which was based on the running and previous European projects at the time. It utilised and tested the existing knowledge and R&D results. Finally, MODSAFE developed an agreed process and layout for generic safety proofs for urban guided transport safety systems in order to improve future cross acceptance.

The following outputs were expected:

- a 30 to 40 % reduction of manufacturing and construction costs through a serious reduction of the currently approval cost by contributing cross-acceptance. The result of the project will be the basis
to reduce the approval effort to an approval by one member state and the cross-acceptance by the others.

- a 10% reduction in maintenance of transport infrastructures, as the project will reduce the costs for the implementation of new control command and signalling systems which require less maintenance.
- promote the start-up and emergence of new high-tech SME's in activities specific to transport processes. The project will provide a generic guideline for the safety and the security of control command and signalling systems for urban transport applications. This will reduce the effort of issues like safety approval, assessment and safety management. The project therefore contributes SME's on both the operators and the manufactures side.

Approval costs are a huge part of the price for the industry products in the urban transport area. Less effort spent for the approvals allow for a decrease in the price of the products of the industry, stimulating the market for the products, and maintain the level of employment on the industry side.

Products with lower prices maintain on the other side also the level of employments on the operator's side. The operators are increasingly facing open market for transport services - also in urban transport. The more efficient and not too expensive products of the industry will maintain the strong position of the operators on the market. Furthermore the increased introduction of new signalling technology will improve the working conditions for signalling engineers.

With new procedures

**Methodology:**

The overall work plan structure was arranged into a V-Model-like structure as requested per EN 50126, meaning that on the left side we arranged the active Safety Analysis and Model tasks while on the right branch we arranged all those tasks that relate to Verification, Testing, Validation, Approval, Acceptance, Certification etc. The project addressed the full Safety Life Cycle of an urban guided transport project rather than only some dedicated tasks.

Central to the work plan is the envisioned Urban Guided Transport Safety Model. The security related tasks were arranged as task structure below the V-Model, meaning that it interacts at the realisation level rather than at any individual element of the traditional safety life cycle.

All partial analyses was based on previous analyses of MODURBAN and the State-of-the-Art analysis.

The European CENELEC Standards suggested a complete Safety Life Cycle approach for guided transport systems which was taken fully into account where appropriate (e.g. Technical Safety Report structure or RAMS arbitration) and interpretation was delivered where the standard as such appears inappropriate. Equally important, safety legal instruments and directives active in the Member States and often implemented since many decades (e.g. Germany, Hungary and France) were mirror imaged with the CENELEC Standards to provide for avenues of interpretation and/or adaptation of the respective instruments.

On the legal perspective, national regulations varied the most. Some countries like Germany employ legally installed local authorities (TAB) at the level of the 'federal states' - and accompany with own safety experts the local operators in safety acceptance and certification. Other countries shift these responsibilities in more diverse responsibility repartitioning to district or region levels with state and operator institutions interfering (e.g. France). Again other countries authorise large operators (e.g. London Underground) to supervise and manage/supervise the safety life cycle on their own.

While it appeared difficult to justify the implementation of a Europe wide authority interfering with the safety life cycle of urban projects, the central objective of all Work Packages of MODSAFE was to yield Cross Acceptance of once proven and certified technologies in one country to another country of the European Community.

Only if a harmonised and accepted Hazards and Risk Analysis and a joint Safety Requirements/Safety Integrity Level Database are

**Parent Programmes:**

FP7-TRANSPORT - Transport (Including Aeronautics) - Horizontal activities for implementation of the transport programme (TPT)

**Institute type:** Public institution

**Institute name:** The European Commission

**Funding type:** Public (EU)

**Lead Organisation:**
| Organisation                           | Address                                      | EU Contribution |
|---------------------------------------|----------------------------------------------|-----------------|
| Tuev Intertraffic Gmbh                | Am Grauen Stein/Konstantin-Wille-Strasse 1   | €398,807        |
|                                       | 51105 KOELN                                  |                 |
|                                       | Germany                                      |                 |
|                                       | Organisation Website:                       |                 |
|                                       | http://www.tuv.intertraffic.de               |                 |
| Partner Organisations:                |                                              |                 |
| Kite                                  | Contrada Costa 9                             | €193,080        |
|                                       | 21034 COCQUIO TREVISAGIO                     |                 |
|                                       | Italy                                        |                 |
|                                       | Organisation Website:                       |                 |
|                                       | http://www.kitesolutions.it                  |                 |
| European Union Road Federation        | Avenue Louise 106                           | €101,607        |
|                                       | 1050 BRUXELLES                               |                 |
|                                       | Belgium                                      |                 |
|                                       | Organisation Website:                       |                 |
|                                       | http://www.unife.org                         |                 |
| Metro De Madrid                       | C/ Cavanilles n°58                          | €75,624         |
|                                       | 28007 MADRID                                 |                 |
|                                       | Spain                                        |                 |
|                                       | Organisation Website:                       |                 |
|                                       | http://www.metromadrid.es                    |                 |
| Tuv Rheinland Consulting Gmbh         |                                              |                 |
|                                       | Am Grauen Stein                              |                 |
| Organisation | Address | EU Contribution |
|--------------|---------|-----------------|
| Koeln        | 51105 Koeln, Germany | http://www.forschungsmanagement.de; http://www.tuvpt.de | €306,603 |
| Rail & Bus Consultants GmbH | Fritz-Vomfelde-Strasse 8, 40547 Dusseldorf, Germany | | €186,150 |
| Thales Rail Signalling Solutions Inc | Ormont Drive 1235, Toronto, Ontario, M9L 2W6, Canada | http://www.thalesgroup.com | €38,340 |
| Universite De Technologie De Compiegne | Centre Benjamin Franklin, Rue Roger Couttolenc, 60206 Compiegne, France | | €57,187 |
| Budapest University Of Technology And Economics | Muegyetem rakpart 3, BUDAPEST, 1111, Hungary | http://www.bme.hu | €150,696 |
| Dimetronic Sa | AVDA DE CASTILLA EDIFICIO GRECIA 2, 28830 MADRID, Spain | http://www.dimetronic.es | €55,112 |
| Organisation Name                              | Address                                                                 | EU Contribution |
|-----------------------------------------------|--------------------------------------------------------------------------|-----------------|
| Universite Polytechnique Hauts-De-France      | Le Mont Houy, 59313 Valenciennes, France                                  | €56,784         |
| Ansaldo Sts France                            | Avenue du Canada 4, 91940 LES ULIS, France                               | €97,058         |
| Ferrocarril Metropolita De Barcelona          | Carrer 60, n°21-23, Sector A, Zona Franca, 8040 BARCELONA, Spain         | €35,806         |
| Union Internationale Des Transport Publics    | Rue Ste. Marie 6, 1080 BRUXELLES, Belgium                                | €225,773        |
| Bombardier Transportation GmbH                | Schoneberger Ufer 1, 10785 Berlin, Germany                               | €80,200         |
| Regie Autonome Des Transports Parisiens      | 54 Quai De La Rapee, 75599 Paris, France                                 |                 |
| Organisation Website: | EU Contribution: €387,202 |
|----------------------|--------------------------|
| **Institut Francais Des Sciences Et Technologies Des Transports, De L'aménagement Et Des Réseaux** |
| Address: 2, Avenue Du General Malleret-Joinville 94114 Arcueil France |
| EU Contribution: €166,605 |

| **London Underground Limited** |
| Address: Broadway, 55 London SW1H 0BD United Kingdom |
| Organisation Website: [http://www.tube.tfl.gov.uk](http://www.tube.tfl.gov.uk) |
| EU Contribution: €101,007 |

| **Alstom Transport Sa** |
| Address: 3 Avenue André Malraux 92300 LAVALLOIS-PERRET France |
| Organisation Website: [http://www.alstom.com](http://www.alstom.com) |
| EU Contribution: €69,054 |

| **Société Technique Pour L'énergie Atomique** |
| Address: Lieu Dit Les Hautes Rives - Route De Saint Aubin 91190 Villiers-Le-Bâcle France |
| EU Contribution: €90,060 |

| **Technische Universitaet Dresden** |
| Address: Helmholtzstrasse 10 1069 Dresden Germany |
| Organisation Website: [http://www.tu-dresden.de/](http://www.tu-dresden.de/) |
| EU Contribution: €286,628 |

**Technologies:**
Key Results:

The MOVE-TOGETHER project has been used as a platform for testing and further developing citizen consultation processes and for putting these in use in communication and public relations.

The MODSAFE project successfully started in 2008 with State-of-the-Art evaluations and initial models. Hazard analyses, safety requirements as well as functional and object models have been developed together with a safety life cycle approach proposal and a generic acceptance, approval and certification proposal. As regards the security sector, the existing means and technologies for security systems have been analysed, and strategies and measures for improvement have been defined.

Strategy targets

An efficient and integrated mobility system: Acting on transport safety: saving thousands of lives

Documents:
- D1.2 Final report - State of the art on safety responsibilities and certification (Other project deliverable)

STRIA Roadmaps: Other specified
Transport mode: Multimodal transport
Transport sectors: Passenger transport
Transport policies: Safety/Security
Geo-spatial type: Urban