MARKET IMPACT EVALUATION
ERRAC was set up in 2001 and is the single European body with the competence and capability to help revitalise the European rail sector:

- To make it more competitive
- To foster increased innovation
- To guide research efforts at the European level

ERRAC Project Evaluation Working Group (EWG)
Objectives:
- Determine the market impact of previous rail research to improve use of research funding
- Ensure a strategic approach to the prioritisation of rail research

Project Evaluation
- Individual projects are evaluated after they have been completed to ensure successful dissemination of project results
- To ensure that the results of previous rail research can be taken into account for future projects
- To avoid weak market uptake of results by learning the lessons of previous research
- The EWG will provide intelligence based on the project evaluations for input into future European Framework Programmes
ERRAC Project Evaluation Group

ROSIN

EVALUATION FROM 5th MAY 2006

Project acronym: ROSIN
FP: 4
Programme acronym: TELEMATICS 2C
Project Reference: 94/801/EC
Call identifier: FP5- Strengthening competitiveness
Total Cost: € 5,483,000
EU Contribution: € 2,600,000
Timescale: January 1996 - April 1998
Project Coordinator: Mr Ulrich Schmidt
EG Schienenfahrzeuge GmbH (DE)

- Presented by: M. Robinson
- Date of evaluation: 15.05.06
- Market uptake: Strong
- Follow up projects: None
- Other related Projects: EUROMAIN and TRAINCOM

Web references: http://www.rosin.org/
## EUROMAIN

### EVALUATION FROM 5th MAY 2006

<table>
<thead>
<tr>
<th>Project acronym:</th>
<th>EUROMAIN</th>
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<tr>
<td>FP:</td>
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<td>EU Contribution:</td>
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<td>Project Coordinator:</td>
<td>Mr Gernot Hans</td>
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<td>BOMBARDIER transportation GmbH</td>
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- Presented by: M. Robinson
- Date of evaluation: 15.05.06
- Market uptake: Strong
- Follow up projects: None
- Other related Projects: ROSIN and TRAINCOM

Web references: http://www.euromain.org/
## TRAINCOM

**EVALUATION FROM 5th MAY 2006**

<table>
<thead>
<tr>
<th>Project acronym:</th>
<th>TRAINCOM</th>
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<td>Project Reference:</td>
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<td>Project Coordinator:</td>
<td>Mr Enrich Renner</td>
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<td>SIEMENS</td>
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- Presented by: M. Robinson
- Date of evaluation: 15.05.06
- Market uptake: Strong
- Follow up projects: None
- Other related Projects: EUROMAIN and TRAINCOM

Web references: http://www.traincom.org/
ERRAC Project Evaluation Group

Plenary meeting
May 15 2006
Background: before the EU Funded Projects

- When sophisticated IT was introduced to the railways in the 1980's it was quickly recognised that there was a need for digital devices to be able to exchange data with each other.
- Many proprietary solutions were launched, and by 1990, some 20 of them were available in Europe.
- An urgent need for harmonisation was recognised and IEC and UIC established WG22 to define a common Train Communication Network (TCN) standard.
- The WG22 produced good results, so it was decided to move to a pilot implementation through an industry consortium producing the hardware and software to build a TCN.
- A test train, involving coaches from 4 countries was assembled and this enabled the first real life tests of the network (without applications) to be made: the ERRI test.
ROSIN – TRAINCOM – EUROMAIN Timeline

- **ROSIN**: Train bus protocol standardisation, FP4 started in 1996, €5.9m (€2.6m EU grant), defined, developed & demonstrated a range of open applications based on the IEC TCN standard

- **TRAINCOM**: Train bus to trackside communication standardisation, FP5 started in 2001, €8m (€3.8m EU grant), Further extended the TCN system to offer a range of open applications for exchange of vehicle maintenance data

- **EUROMAIN**: Train to trackside maintenance protocols, FP5 started in 2002, €7.3m (€3.5m EU grant), Again extended the TCN system to offer a range of open applications for train to trackside communications

- **INTEGRAIL**: Integrated project: FP6 started in 2005, €20m (€11m EU grant), Communications Integration covering infrastructure, vehicles, train preparation & fleet management in accordance with the needs of the Interoperability Directives and the three Railway Packages
## Relationships with previous projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Description</th>
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<tbody>
<tr>
<td>EUROMAIN (2002-2004)</td>
<td>Specification of a complete railway maintenance system at European level</td>
</tr>
<tr>
<td>TRAINCOM (2000-2003)</td>
<td>Integration of railway and ICT to link train and ground systems, allowing to develop new interoperable applications</td>
</tr>
<tr>
<td>ROSIN (1996-1999)</td>
<td>Specification and validation of a complete train network platform, open to other systems and to any kind of suitable applications</td>
</tr>
<tr>
<td>ERRITEST (1993-1996)</td>
<td>Development of real train applications communicating by means of TCN and test of a complete system in the laboratory and on board a train in normal operation</td>
</tr>
<tr>
<td>JDP (1992-1998)</td>
<td>Development of the first working implementation of TCN at the prototype level, including ASIC’s and software</td>
</tr>
<tr>
<td>IEC-TC9-WG22 (1989-1999)</td>
<td>Specification of a complete protocol specification for a train communication network (TCN) according to OSI structure</td>
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</table>
### Enlargement of membership

<table>
<thead>
<tr>
<th>Group</th>
<th>Members</th>
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<tbody>
<tr>
<td>EUROMAIN</td>
<td>EU, Bombardier, SIEMENS, AnsaldoBreda, ATSF, Laboratori Marconi, Alstom,</td>
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<td>2002</td>
<td>AtosOrigin, Far Systems, Silogic, CAF, DB, ÖBB, RENFE, Trenitalia, SNCF</td>
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<td>TRAINCOM</td>
<td>EU, Bombardier, Firema, SIEMENS, Ansaldo, Alstom, Atos, Far Systems,</td>
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<tr>
<td>2000</td>
<td>Silogic, CAF, DB, ÖBB, RENFE, FS</td>
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<td>UIC 5R</td>
<td>UIC, ERRI, ERS, ADtranz, Firema, SIEMENS, Ansaldo, Alstom, Traxis,</td>
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<tr>
<td>1999</td>
<td>ELIN, Focon, EKE, DB, NS, FS, ÖBB, SNCF, CKD</td>
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<tr>
<td>ROSIN</td>
<td>EU, ADtranz, Firema, SIEMENS, Ansaldo, LAB, Alstom, CAF, DB, FS, ÖBB,</td>
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<tr>
<td>1996</td>
<td>SNCF, Eusko Tren</td>
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<td>IGZ</td>
<td>ABB, AEG, Firema, SIEMENS, ERRI, Holec</td>
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<tr>
<td>1994</td>
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<tr>
<td>JDP</td>
<td>ABB, AEG, Firema, SIEMENS</td>
</tr>
<tr>
<td>1990</td>
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</tbody>
</table>
ROSIN

- To accelerate the slow moving standardisation process, the ROSIN project was started in 1996. The idea was to achieve a wider consensus, showing the benefits which TCN could bring to real onboard applications for passenger trains, freight trains & mass transit.
- In addition, locomotives, not included in the original ERRI test, were included contributing to the preparation of the UIC 647 leaflet.
- ROSIN was able to reach its main goal and in 1999 the TCN reached the status of an International Standard (IEC-61375-1).
- It also contributed to the definition and test of the TCN data traffic, as described in leaflet UIC 556. A suitable automated tester was also developed and demonstrated.
TRAINCOM

- TCN allows linking of devices onboard trains, both in the same vehicle (vehicle bus) or in different vehicles (train bus). However, trains are not isolated systems: they are part of a wider railway system. Radio links (e.g. GSM-R) can allow to establish a connection between trains and ground systems but, again, this needs to be done in a standardised way, to avoid that each application will develop an independent radio link.

- Between 2000 & 2003, TRAINCOM defined a general communication infrastructure, supporting at the same time many different applications, like passenger information and maintenance, through an IP-based network. Cross interoperability of communication devices was demonstrated, as well as real life operation on several trains.

- As TCN was now a standard, a conformity test procedure was developed, contributing to a new part to the standard (IEC-61375-2) & developing a complete test platform for TCN.

- The project also demonstrated remote control of locomotives linked via TCN, according to the UIC 647 EU remote control leaflet.
EUROMAIN

• Maintenance applications were only roughly treated in TRAINCOM, due to a budget cut when the project was approved, so no live demonstration was possible.

• The TRAINCOM partners decided that, if first results in this field were promising, a specific project could be promoted. Therefore the EUROMAIN project was launched in 2002, defining the elements of a European maintenance system able to handle diagnostic data, technical documentation and the interface with other systems or maintenance operators. An extensive demonstration programme involved trains in different countries.

• Through scalable "standard" interfaces, diagnostic data coming both from trains and ground plants can be routed through a number of distributed nodes, combined with relevant technical documentation and delivered to the final destination.

• Part of the system specification was included in a standardisation proposal (CENELEC WG B14). EUROMAIN activity was concluded in March 2005.
SUMMARY:
Deployment of the ROSIN, TRAINCOM & EUROMAIN

- Deployed train bus nodes (WTB): ca. 28,000
- Deployed vehicle bus nodes (MVB): ca. 243,000
- Equates to ca. 20,000 vehicles (Trams, Metros, Locos, EMU, High Speed Trains, …) delivered all over the world
- Certified WTB/UIC556 nodes available from 6 different manufacturers in 5 countries
- Three certified UIC 556 conformance test labs
- Enabling technology, hard to quantify in units & monetary terms but most applications in trains delivered today are based on cluster results (diagnosis, multi-traction, passenger information, etc.…)
- Gives communications abilities not previously available
- Extra value received from information to passengers; maintainers and operators relating to perceptions of journey quality; anticipating maintenance; using the potential of the new systems for operational reasons.
Economic Benefits

- Increased scale of manufacture through HW/SW harmonisation – previous high cost of IT systems have gone down
- Engineers in system integration companies and their sub-suppliers only need one common set of software protocols and the C++ language
- Aids integration of train sub-systems – even remotely
- Technology paves way for more economic and faster repair of RST – reduced downtime increases availability – paves way for automated diagnostics & maintenance regimes such as maintenance on demand and preventive maintenance.
- Collection of data on board at train level and at remote server vital for these diagnostic & EPIS processes
- Aids inter-operable operation of RST across Europe
- Better use of track capacity by ability to couple/uncouple, merge and split trains on-route
- Improved passenger experience through better EPIS
- Smoother multiple traction when double-heading trains or co-ordinating multiple power cars
Evaluation criteria - Rosin/Traincom/Euromain

1. Were the results implemented in the design of the new products and services? Were these new products/services put into commercial operation – yes
2. Is new legislation and standardization based on findings from this research project – yes to standards but no new legislation
3. Are the results of the project implemented across Europe or only in a small number of Member States – yes, across Europe
4. Are the results of the project implemented outside Europe before being accepted in Europe – inside and outside Europe simultaneously
5. Did the projects increase competitiveness of the European railway sector abroad with regard to products, services, standards and system design – yes
6. Did the project increase competitiveness of the railway transportation compared to other transport modes – yes
7. Are the results of the project taken into consideration when preparing public tenders – yes
8. Does the implementation of the project results help facilitate cross-border operations by problem-solving in the domain of interoperability – certainly
9. Does the implementation of the project results help facilitate inter-modal operations by problem-solving in the domain of inter-modality – potentially yes
10. Can benefits be assessed in financial terms – difficult
Reasons for success

• Driven by need to contain increasing technical complexity
• Continuity & ability to build one project on its predecessors
• Market need for harmonised solutions for TCN and its extensions
• Consortium breadth
• Some partners started from a similar starting level but projects was truly pre-competitive in its nature
• Key operators involved for requirements & assessment of results