ERTMS IN OPERATION

IRSE Seminar London, 15th November 2011
Agenda

1. Corridor A background
2. ERTMS framework conditions
3. Corridor A ERTMS deployment concept
4. ERTMS implementation plan
5. Risk management
6. Testing and authorisation
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1 Corridor A background
The ERTMS Corridor Rotterdam Genoa runs through the industrial heart of Europe.

Demand
- Rail cargo transport expected to double within 15 years on the corridor

Achievements expected
- Reliability +26%
- Capacity +52%
- Time -20%
- IM-Cost -10–15%

2030 Break Even External Cost vs. Investments

- Line distance
  - Rotterdam-Genoa: 1,400 km
  - Zeebrugge-Genoa: 1,500 km
- 4,900 km of corridor tracks
- 9 new tunnels with 130 km length
- 4 sea ports, 6 inland ports
- 50 main terminal facilities

International freight trains in 2010:
- 22,871 at Emmerich
- 43,552 at Basel
- 20,023 at Domodossola
- 12,477 at Chiasso
- 11,463 at Luino

Ø 22h transport time (end to end)
1. Corridor A background

Since 2003, Corridor Rotterdam-Genoa is successfully progressing in three major strategic directions.

**Motivation**

- Shift traffic from road to rail
- Meet market requirements
- Improve European rail freight services

**Strategic Directions**

- Create Inter-operability
- Eliminate Infrastructure Bottlenecks
- Establish Total Service Concept

The combined development of all areas generate operational and economical benefits.
Materialisation of achievements needs involvement of all parties from start to end of the transport chain

- provision of interoperability from ERTMS and harmonised infrastructure parameters
- Coordination of new investments
- Enhancement of productivity of infrastructure & operations
- Implementation of freight regulation for offering competitive rail freight capacity and services
- Raising socio economic effects
Corridor A organisation reflects ERTMS implementation as one key element in the development of the corridor.

1. Corridor A background

Corridor Programme Management Office (PMO) manages all aspects on the Corridor Rotterdam-Genua on behalf of the MB.
The initial commitments for ERTMS implementation are anchored in three agreements of the EC and ministries:

1. **MoU Brussels 2005**
   - EC, CER, UIC, EIM, UINIFE
   - Establishment of basic principles for the European ERTMS deployment strategy

2. **Lol Bregenz 2006**
   - Ministries of NL, DE, CH, IT
   - Implementation of ERTMS on freight corridor Rotterdam – Genoa

3. **MoU Rome 2008**
   - EC, CER, UIC, EIM, UINIFE
   - Speeding up ERTMS implementation, focusing on Baseline 3 development

**Origin of corridor implementation programme and management structure**
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2. ERTMS framework conditions
ERTMS implementation is an important part in the corridor system and of its overall goal

Key questions
- Objectives of EC?
- Why ERTMS on corridors?
- Prime corridor objectives?
- Business objectives of IMs?
- Business objectives of RUs?
- Situation of class B systems?
- Which funds are available?

Key answers
- Swift ERTMS migration in Europe
- ERTMS needs a network to be operated
- Interoperability is much more than ERTMS
- Complexity reduction to foster rail transport
- Using existing systems until end of lifetime and increase productivity
- Flexible rolling stock, no system upgrades
- Capacity, safety, LCC cost, compatibility
2. ERTMS framework conditions

The ERTMS deployment strategy has to take into account synergies from corridor measures

ERTMS has to deliver benefits

= focus on added value

Added value from ERTMS depends on complementary measures in the corridor programme

What will be different after the delivery of the programme?
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3 Corridor A ERTMS deployment concept
In 2008, the IMs of Corridor A decided to agree on a joint deployment concept.

**Baseline 3**

The IM-CEOs of Corridor A on 18 June 2008 jointly decided to implement ERTMS on the corridor by the principle of deployment of Baseline 3 in order to assure and support the swift development of Baseline 3 for the benefit of the entire corridor migration by IMs and RUs.

The implications and basic principles resulting from this decision are adopted in this common ERTMS deployment concept.
3. Corridor A ERTMS deployment concept

Which criteria regarding the ERTMS deployment concept are important for Corridor A?

Baseline 3

1. **TSI conformity** and substantial maturity of the deployed system is a “must”

2. **Intermediate installations** and versions shall be avoided, trackside and train borne

3. **Deployment technology** shall be technically and economically beneficial for both, IMs as well as for RUs, our clients

4. **Interoperability** of cross border rail traffic shall be stable and assured on long term

5. **No major signalling replacements** prior to end of lifetime shall be caused by the deployment technology
Corridor A has assessed technical criteria which are essential for its ERTMS implementation.

Baseline 3

1. Level 1 limited supervision mode (CR 637) is a “must” to allow for an economical migration process.

2. System performance shall be higher or in minimum similar to national class B systems.

3. Essential functions such as e.g.
   - braking curve model (CR 595),
   - start of mission (CR 751),
   - crypto key management (CR 758),
   - train categories (CR 770),
   - lines under construction (CR 756),
   - version management (CR 757)
account for an economic installation and operational performance.
3. Corridor A ERTMS deployment concept

Which strategic elements are needed to make this concept work?

- **Joint commitment of the corridor IMs** for deploying Baseline 3 on Corridor A and in all projects from 2013 onwards

- **Paralleling the processes** of validation, product development and corridor implementation **to speed up Baseline 3 deployment**

- **Joint cooperation** of EC, ERA, Users Group, NSAs and UNIFE in the Baseline 3 process **to generate synergies**

- **Early and common contracting of** corridor ERTMS installations to create business volume

- **Arranging an MoU** between IMs of the Corridor and UNIFE about the principles of this concept **to promote Baseline 3**
3. Corridor A ERTMS deployment concept

Which chances are in this deployment concept?

Baseline 3

1. **Stable ETCS horizon for the RUs** due to early availability of Baseline 3 thus limiting upgrade efforts and costs in future.

2. **Early detection and correction of software failures** resulting either from specification or product development saves effort and raises quality.

3. **Controlled Baseline 3 effort** due to the common and defined target dates of the joint development process of Baseline 3.

4. **Better ETCS prices and conditions** because of the competition created by the parallel call for tenders of all corridor IMs.

5. **Total use of the EU subsidies** due to project expenditures within the funding period ending in 2013.
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4. ERTMS implementation plan
The ERTMS implementation plan shall serve for the timely information of all parties which are affected.

Key information:
- Corridor breakdown into sections of different ERTMS deployment technologies
- Class B systems which are currently in use
- Shut down dates of class B systems in each section
- ERTMS level which will be used and where
- ERTMS baseline which will be used and where
- ERTMS completion dates ready for use in each section
4. ERTMS implementation plan

In 2016, RUs will be able to run along the corridor on ERTMS except for section Oberhausen-Katzenbergtunnel.
4. ERTMS implementation plan

**ETCS track side installations determine the requirements for the train borne equipment**

<table>
<thead>
<tr>
<th>Track side installations</th>
<th>Train borne requirements</th>
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</thead>
<tbody>
<tr>
<td>ETCS SRS 2.3.0d &gt; 2015</td>
<td>( \geq \text{SRS 2.3.0d} )</td>
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<tr>
<td>*PZB &amp; (LZB)</td>
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<tr>
<td>ETCS SRS 3.x.x &gt; 2015</td>
<td>SRS 3.x.x</td>
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<tr>
<td>(Except HSL, LBT, GBT, CBT)</td>
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<tr>
<td>ETCS SRS 3.x.x/ 2.3.0d &gt; 2015</td>
<td>SRS 3.x.x/ 2.3.0d</td>
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</tbody>
</table>

* Belgium part not included

*STM for PZB
Until 2015, the considerable ETCS rollout needs close coordination among IMs and corridor traffic in service.
Risk management
What makes ERTMS on the Corridor Rotterdam-Genoa an international and special project?

- 5 Nations
- 5 Languages
- 6 IMs (customers)
- 5 NSAs
- 6 Border sections
- 5 System migrations
- 3 ERTMS levels & modes
- 6 ERTMS suppliers
- ? supply contracts

This requires a strong system integration on corridor level
Which technical, organisational and legal aspects are relevant in the corridor ERTMS implementation works?

To reduce risk and claim management, supply contracts need coordination ...

1. Data preparation for Reference Data Base
   - Part of scope
   - Common format
   - Property rights
   - Time line
   - Language

2. Time schedule for IOP & cross border tests
   - Part of contracts
   - Quantification
   - Flexibility
   - Track costs
   - Penalties

3. Provision of test labs, locos, OBUs
   - Part of scope
   - To be shared
   - Test OBU
   - Test vehicle

4. Cooperation in testing/debugging on corridor
   - Part of scope
   - Subsets 110/111/112
   - Sharing results
   - Repeating of tests

5. Intellectual property rights on test results
   - Part of scope
   - Results to be shared among Cor. partners

6. Liability for third party damages
   - Which cases
   - Responsibility
   - Cost basis
   - Quantification

7. After Sales Service contract
   - Future IOP deficiencies
   - Upgrades
   - Tests
   - Costs
   - Process

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5. Risk management

To start the risk management process, an analysis of cross impact risks was executed.

70 cross impact risks were identified.
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7 Testing and authorisation
Corridor A is early implementer of ETCS across borders thus driving the enhancement process

**Today’s situation**
- Project specific lab and field tests have to be repeated for each combination „operator/supplier/SW version”

**Transition period**
- **Corridor approach**, using a harmonised process for test and authorisation / supplier/SW version

**Target situation**
- Any certified train can operate on any certified track without additional checks

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7. Testing and authorisation

Generic tests

Project specific tests in lab

Project specific tests on site

Iterative enhancement

... down to a minimum

... down to a minimum

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7. Testing and authorisation

A European reference of track side functions will grow stepwise with each new installation.

Functions implemented in corridor projects:
- Supplier A
- Supplier B
- Supplier C

Functions not implemented in corridor projects:
- only used in Switzerland
- only used in Netherlands
- only used in Italy
- only used in Germany
- only used in Switzerland
- only used in Italy

SUBSET-026

Rotterdam
Köln
Mainz
Karlsruhe
Offenburg
Fremiburg
Basel
Brig
Chamodossola
Chilasso
Chur
Novara
Alessandara
Milano
Torino
Genua
Lötschberg
Milano - Torino Milano - Bologna

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On-board ETCS subsystems can only be validated against the functions implemented on Corridor A.

On the corridor, OBUs can be validated with the functions implemented in NL, D, CH & IT.
Based on the European authorisation process, NSAs prepare a Corridor A Guideline for the transition period.

Authorisation Process Overview

- APS(L) of vehicle R = SS CCS + SS RST + others
- APS of line L = SS CCS + SS INF + others
- APS of trackside SS CCS of line L

CoC/DoC: Certificate/Declaration of Conformity

SS: Subsystem
ENE: Energy
INF: Infrastructure
IOP: Interoperability
LEU: Lineside Electronic Unit
LOC & PAS: Locomotives and Passenger rolling stock
NOI: Noise
NR: National Rule
NSA: National Safety Authority
OBU: On-Board Unit
OPE: Operation
PRM: Persons with Reduced Mobility
RBC: Radio Block Center
RST: Rolling Stock
SRT: Safety in Railway Tunnels
SS: Subsystem
TSI: Technical Specification for Interoperability

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8. Conclusions

**Conclusions**

- ERTMS implementation across borders relies on the strong cooperation among IMs and all involved partners over the borders.

- ERTMS implementation needs to be embedded in a programme of infrastructure, operational and logistical measures to become effective.

- ERTMS is a system which comprises track side and onboard subsystems, as well as operational rules.

- ERTMS implementation shall be based on a deployment strategy accounting for the least burden put on the shoulders of our customers, the RUs.
Thank you for your attention!

Questions

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