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

INTELFRET

EVALUATION FROM OCTOBER 2006

Project acronym: EUFRANET
FP: 4
Programme acronym: TRANSPORT
Project Reference: 94/914/EC
Call identifier: FP04 Encouraging modal shift and decongesting transport corridors
Total Cost: € 1,437,193
EU Contribution: € 602,255
Timescale: August 1997 – January 1999
Project Coordinator: Georghe Barbu

- Presented by: S. Mitra
- Date evaluation: 16.10.06
- Market uptake: Weak
- Follow up projects:
- Other related Projects:

Web references: http://www.transport-research.info/web/projects/project_details.cfm?id=437&page=contact

ERRAC Project Evaluation Group
INTELFRET-
INTELligent FREight Train
Innovation Rail Freight Transport Concept

Meeting of 18 October 2006

Draft SM

Background: INTELFRET

- Due to improved competitiveness of road freight, the share of rail freight has declined over last 25 years
- Restructuring of American railroads and European experience suggested potential for growth provided a long-term market orientated, technically strong and financially achievable strategy developed and applied
- The INTELFRET project was conceived to propose an innovative rail freight transport concept able to efficiently comply with customers' and operators' needs. It studied the operational problems and how technology could be used for automation and intelligent rail freight systems.
- The project focused on 'Intelligent' telematic tools on-board rail freight wagon and train, and on the exchange of data from the ground to the train and from the train to the ground by use of GSM-R, satellite or short range communication (on train-ground data exchange).

Objectives: INTELFRET

•The elaboration of INTELFRET system concept, functional specifications and architecture of the operational system

• Functional requirements for sub-systems and system components

• Analysis and assessment of technical and economic feasibility

• Recommendations for use of technology in the organisational framework aiming at supporting the free access to infrastructure and the improved management of freight transports on rail

• Recommendations and validation of technical solutions, economic use and standardisation

Details: INTELFRET

- FP4
- Total Cost: 1437 kECU
- EU Contribution: 602 kECU
- Period: 01/08/1997 to 30/06/1999
- Project Coordinator: European Rail Reserach Institute
- Project Manager: Mr. Georges Barbu (previously ERRI, now UIC)

Partners- INTELFRET

- The project has been implemented by a group of 10 partners having complementary backgrounds that cover railway, telecommunication and cost aspects with:
- FAIVELEY TRANSPORT (FR) – automation, data transmission systems and interface specifications
- CS TRANSPORT (FR) – system analysis, interface of components and sub systems, technical migration
- N.V. NEDERLANDSE SPOORWEGEN (NL)- wagon architecture specification, retrofitting policy
- MANNESMANN REXROTH PNEUMATIK GMBH (DE) – system integration, data collection and transmission
- KNORR-BREMSE SYSTEME FUER SCHIENENFAHRZEUGE GMBH (DE) – integration of automatic coupling technology for research and technical analysis of the power supply systems
- SCI VERKEHR PLANUNGS-UND BERATUNGS-GMBH FUR- automation, system structure and architecture, functional analysis
- VERKEHRSTECHNIK UND- WIRTSCHAFT
- SAB WABCO S.P.A. (IT) – braking technology, global system specification, technology assessment and integration of braking in the condition of electric control, check and monitoring
- European Rail Research Institute (NL)- Project Management ???
- British Railways Research Limited (AEA Technologies) – safety analysis, definition and analysis of safety cases, validation of telematic application
- Technische Universitat Braunschweig- system modelling, evaluation of data quality requirements, data transmission requirements

Project Phases- INTELFRET

- Phase 1- set out performance levels
  - flexible formation and inauguration of trains
  - electronic break control
  - check
  - monitoring
  - diagnosis
  - train internal communication systems
  - requirements for information data and architecture

Project Phases- INTELFRET

- Phase 2- Establishment and consolidation of global INTELFRET concept and architecture

  - Specification and technical analysis of the Master Locomotive Architecture (based on a two layer LAN networking concept; one corresponding to train control and the other interfacing with the locomotive control and the integration with ERTMS driving)

  - The Wagon Architecture (Two-layers interconnected LAN networking,; base layer enables train serialisation, data collection and transmission, brake control, integrity control and monitoring. The second enables wagon monitoring, diagnosis, automation and cargo monitoring via standard gateways; position location, AVI and external data collection/transmission via specific gateways)

  - The Train Communication Architecture (Train internal LAN is the core of “train intelligence” providing access gateways for all other information sub-systems of the vehicle in the train)

Project Phases- INTELFRET

- Phase 3- Technical assessment of sub systems and components within current technology framework, safe interfacing and flexibility of system checked
  - The braking sub system
  - The coupling sub system
  - The power supply sub system
  - The train internal and external data transmission
  - The final assessment of conception

Project Phases- INTELFRET

- Phase 4 - economic analysis of the system impact and benefits in the rail freight operation, implementation strategies for base system and add-ons
  - Cost analysis based on pre-competitive cost of INTELFRET sub systems and identified the benefit areas: the individual wagon operation and the block operation
  - Two step implementation strategy recommended:

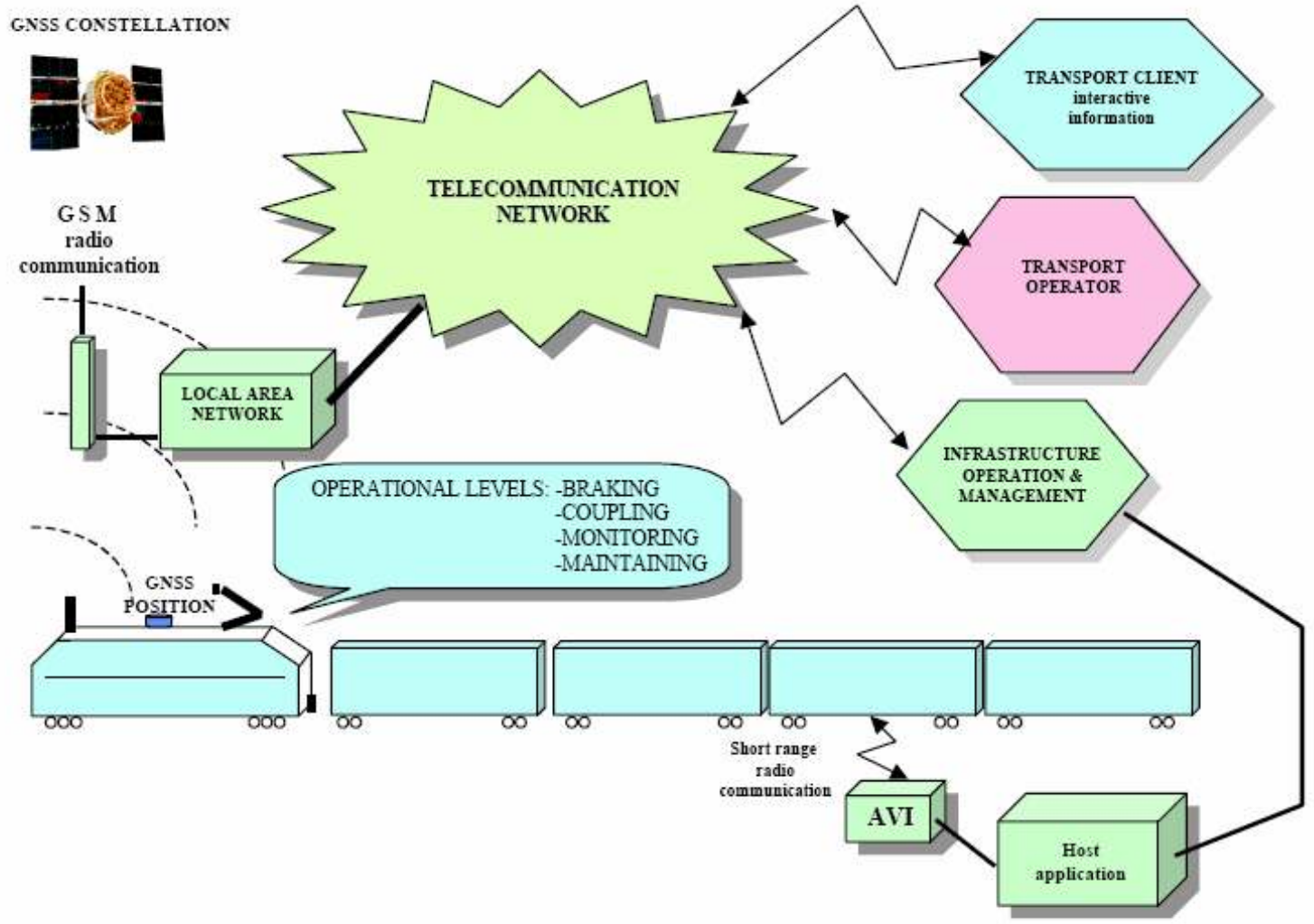
    step 1: implementation of the base INTELFRET option would have maximum impact on productivity and cost

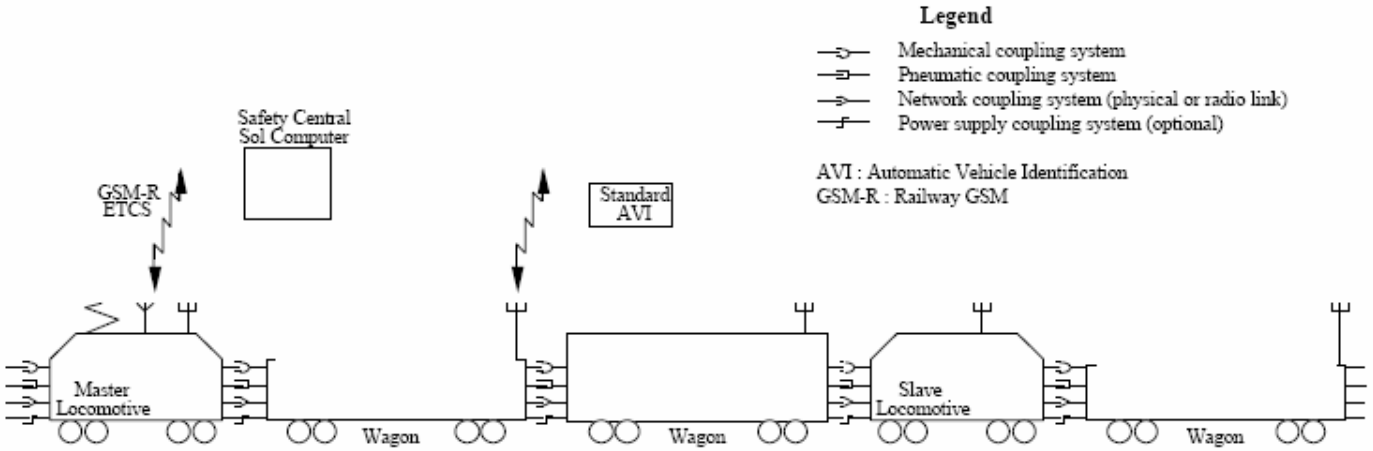
    step 2: Gradual and customised implementation of the add-on information, automation and monitoring

The System functions: INTELFRET

- Brake function
- Coupling function
- Wagon monitoring and diagnosis
- Cargo monitoring function
- Position location
- Customer information function
- Train internal and external information and communication function

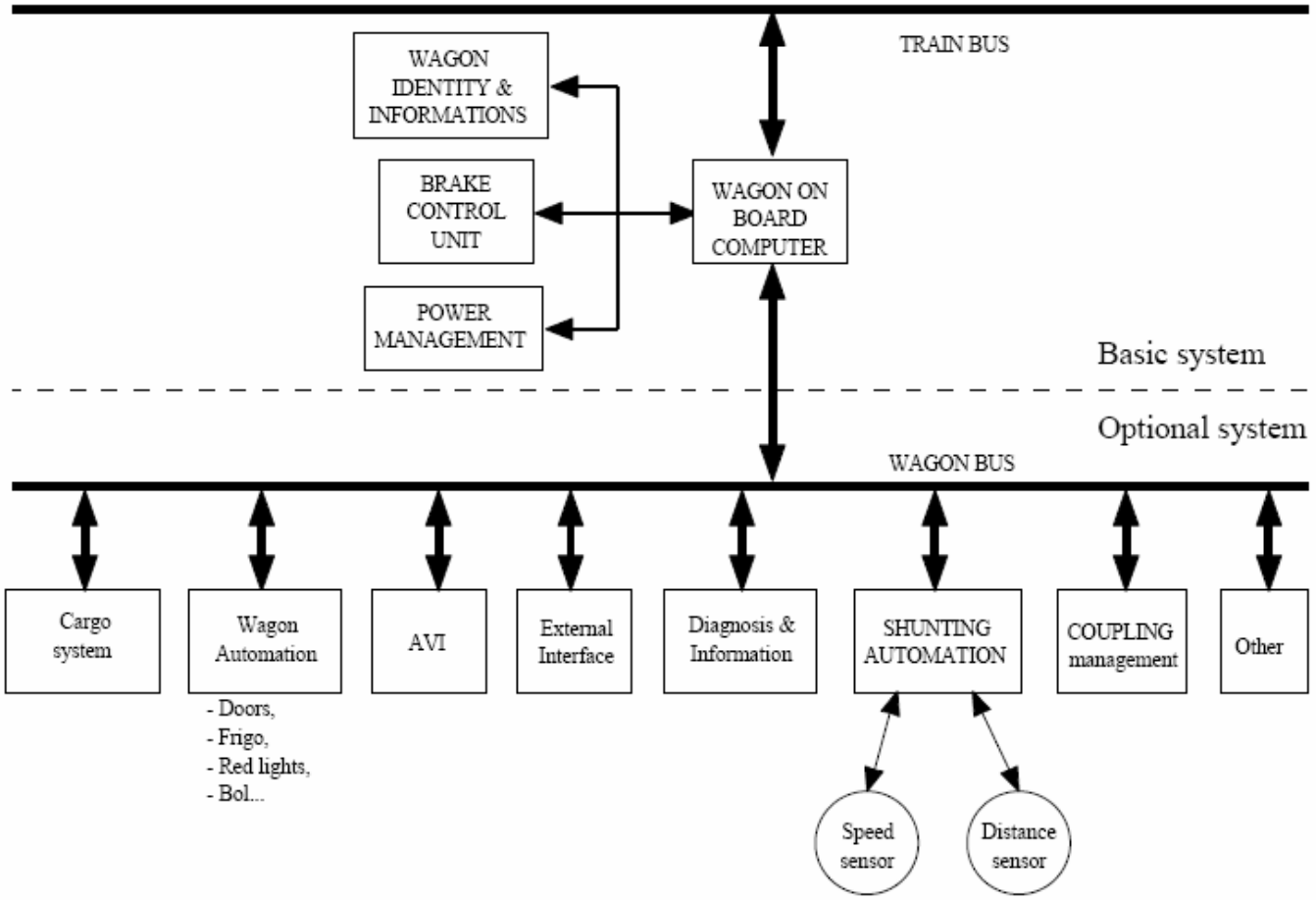
The System framework- INTELFRET



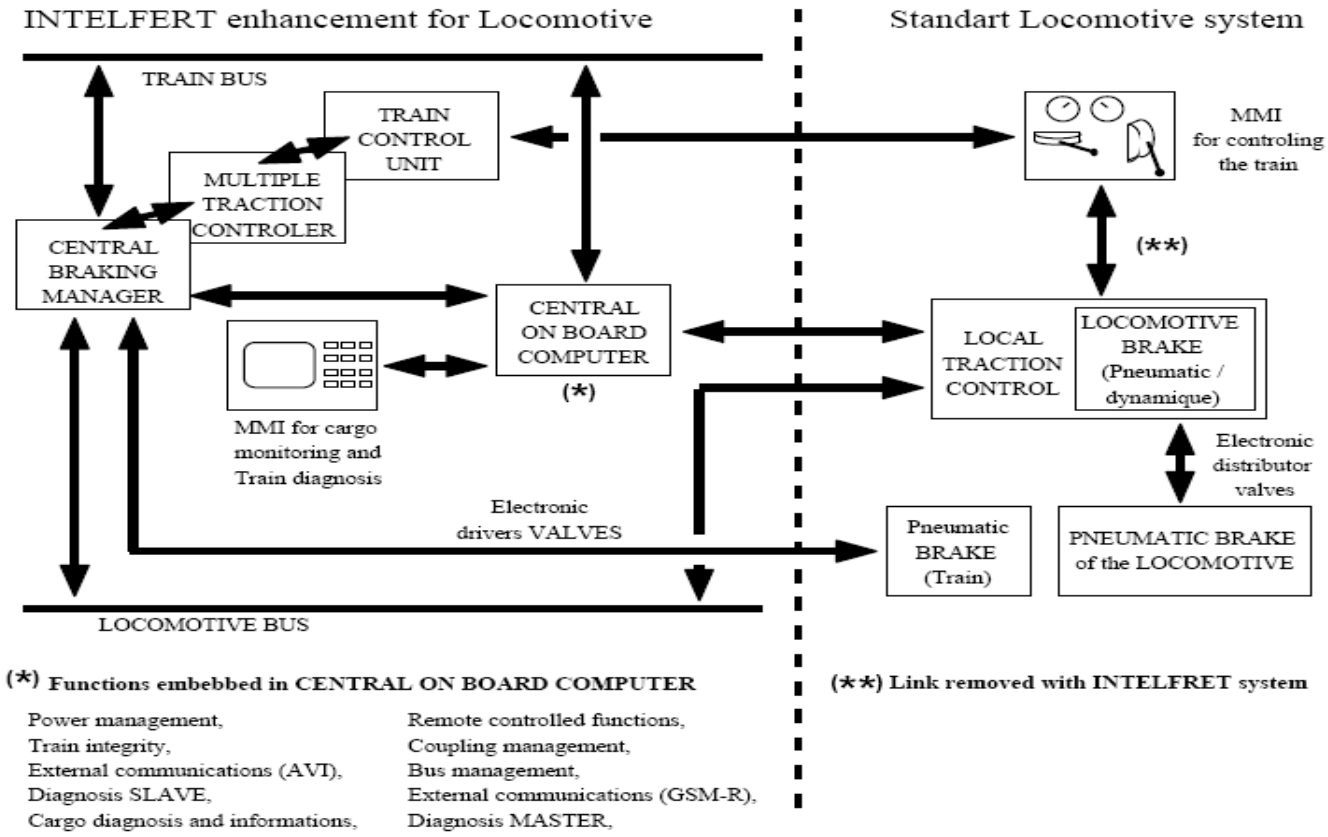


Architecture of INTELFRET train.

An INTELFRET train consists of the following elements, that are either INTELFRET specific or modified elements of ordinary trains :
one or more INTELFRET locomotives,
INTELFRET freight wagons,
the INTELFRET train bus,
INTELFRET Information and Communication subsystem,
electronic braking system,
train management and integrity subsystem,
power management subsystem.



INTELFRET Wagon architecture.



INTELFRET Locomotive architecture.

Research Outcome 1- INTELFRET

- INTELFRET Concept realisation and technology assessment of the INTELFRET based on flexible, scalable and open architecture completed with safety case analysis
- Detailed system specifications and technical consolidation of the INTELFRET sub systems and components
- Economic analysis of the system impact and benefits in the rail freight operation
- Implementation strategies for base system and add-ons

Research Outcome 2- INTELFRET

- INTELFRET base option (electronic brake control + train serialisation)
- Some operational or organisational framework constraints were discovered
- Offers improved performance by using extensive IT and supports enhanced mobility, safety improvements, reducing environmental impact
- INTELFRET add on- require consideration of information platforms within the freight transport market for enhanced accessibility information.

Exploitation and dissemination- INTELFRET

- On priority exploitation plans for (EU profile Industry and FOCs)
- Operators (SNCF, DB, FS) and industry (ALSTOM) reviewed the technical feasibility of implementation of INTELFRET like base option as immediate priority
- INTELFRET 2 was proposed in 2nd call for FP5
- Report published via ERRI and UIC
- European Transport Research Forum in Lille (Nov 99)

INTELFRET: Evaluation (1)

Problems

- Operation constraints - problems to run very long freight trains on some corridors (implications for signalling, marshalling yards, bypass tracks etc)
- Radio spectrum requirement could not be standardised in Europe
- Competition from alternative technological solutions to address operational problems
- Perception from some operators was that the cost for implementation too high

Links / Follow-up Projects:

- EUFRANET- European Rail Freight Network
- HISPEEDMIX- High-speed freight on the European high-speed railway network

Achievements

- Technical feasibility assessment for the implementation of the system was carried out
- Studies established technical specifications for freight information systems and validated a subset of the information system in a demonstrator in railway environment.

INTELFRET Evaluation (2)

1. Were the results implemented in the design of the new products and services? Were these new products/services put into commercial operation? – **No**
2. Is new legislation and standardization based on findings from this research project?– **No, but could be partly connected to the next TSI**
3. Are the results of the project implemented across Europe or only in a small number of Member States – **Not implemented at all**
4. Are the results of the project implemented outside Europe before being accepted in Europe – **similar systems not derived from this project are applied in the USA**
5. Did the projects increase competitiveness of the European railway sector abroad with regard to products, services, standards and system design – **No**
6. Did the project increase competitiveness of the railway transportation compared to other transport modes – **No**
7. Are the results of the project taken into consideration when preparing public tenders – **The specifications of Intelfret could be used for public tenders but currently they are not**
8. Does the implementation of the project results help facilitate cross-border operations by problem-solving in the domain of interoperability – **potentially yes**
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 **– No**

Lessons Learned

- Potential benefits were not fully investigated at the pre-competitive stage
- The preferred solution today seems to be new infrastructure capacity rather than increased utilisation of the existing capacity
- Balance between use of the infrastructure capacity and new technology for optimising rail system with regard to cost and performance (eg. long freight trains, radio communications)
- Competing technology diverted the focus of the project
- A real demonstrator / pilot implementation should be included in the project, not stopping at the level of specifications
- A “show stopper” (lack of standardised radio spectrum) should have been identified before the project launch