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PARTNERS : AEIF, European Association for Railway Interoperability

CIRT, University of Genoa

ENOTRAC AG

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1. Executive Summary

The objectives of the ESC UserGroup project were to expand the contents of the existing ESC InfoBank tool and build a support network of contacts to tackle the issue of electrical systems compatibility (ESC), particularly in relation to the interoperability of European railways. The tool and its contents are intended to assist all railway organisations in the development of Technical Standards for Interoperability (TSI), definition of ESC requirements, the ESC design of railway systems and components and resolution of ESC problems.

The results of the project have been mixed. The collection of ESC information for the ESC InfoBank has been a slow process and required much greater time and effort than originally foreseen by the project partners. However, the content of the database has been increased by 44% through information received through placement of subcontracts and members own contributions. The ESC InfoBank itself has been further refined during the course for the project with improvements made to both the user interface and the administrative functionality of the tool.

Two workshop events have been run, both of which were well attended. These have been critical to fulfilling the other objective of the project which was to build an ESC network across the European railway industry to tackle ESC issues.

The one deliverable not completed satisfactorily according to plan was the implementation of a future business plan for permanent operation of the ESC InfoBank tool and coordination of the ESC UserGroup. Several plans were created and promoted during the project but none came to be realised. In the end one of the partners, ENOTRAC AG, has agreed to maintain access to the ESC InfoBank for the next 2 years at their own expense until December 2003. During this time access to the data contents of the database will be maintained on a “give and take” basis but the opportunities for large information updates and networking will be extremely limited.

Opportunities still exist for the use of the tool and network however. The strongest is to utilise them as a dissemination tool for new ESC project results, requirements and strategies. For example, dissemination of new TSI documents on ESC and the results of further EU funded ESC projects can be ideally exploited through the ESC InfoBank and ESC UserGroup.

The problem of defining ESC interfaces and requirements between owners, operators and suppliers still exists today. The ESC UserGroup project has been a focal point to tackle this over the last 2½ years and has provided tools and information to aid all members facing the issue. The risk is now that without future funding and a patron both of these instruments will vanish. The reality seems to be that either a strategic organisation needs to take the lead and operate these instruments for the benefit of all railway organisations or alternatively each individual railway organisation needs to have readily accessible there own internal database of ESC information which can be easily shared with to other railway organisations.

The benefit of the top down strategy is that ESC has a clear focus, strategy and lines of communication for the benefit of all industry players. The second option allows for closer information management and updating to be performing thus assuring the accuracy and ownership of the different database contents but lacks leadership and coordination with the potential loss of any synergies.

Although no new backer has stepped up to lead this work there is a strong amount of interest industry wide that this lack of clear ESC requirements and interfaces is resolved. Although support in hard financial terms and resources has not readily come forward, vocal support and expressions of interest have been numerous from all segments of the industry. It is clear therefore that this issue requires further attention in the short to medium term future and a strategic industry leader needs to position itself in such a way as to cover this.

2. Objectives and Strategic Aspects

2.1. Background to ESC UserGroup Project

The promotion of environmentally friendly and efficient rail transport of passengers and goods in Europe is a main objective of the European Union. A strength of railways is their potential to run at very high speed on new, dedicated lines, while also being able to share the much larger existing railway infrastructure.

This strength can only fully be exploited if all subsystems are interoperable, i.e., if rail vehicles can freely operate under the different supply systems in use and if they are compatible with the various existing and future traffic-control and signalling systems. Interoperability is a major challenge for European manufacturers and operators of rail vehicles. The EU has addressed this key issue in two directives for interoperability of high-speed systems and for interoperability of conventional railways.

The lack of electrical compatibility of trains with the infrastructure of other networks (power supply, signalling and telecommunication), and with existing vehicles on these networks is a major obstacle for interoperability. Incompatibilities can affect the safety and reliability of the railways if not addressed thoroughly. The consequences can be the breakdown of trains and complete systems (e.g. due to over voltages or instabilities on the power supply), or even accidents due to malfunctioning of signalling systems.

As incompatibility is a *systems* rather than a mere product or service issue, no single operator or manufacturer can tackle this problem alone. With the implementation of EU-Directive 91/440, rail operators and infrastructure owners are run as separate organisations. Further to the split of the former national railways, new train operators with logistics and management experience rather than a railway background are entering the market. Many do not have extensive knowledge and experience of the technical and operational issues involved in railway systems. To give all rail operators fair and equal conditions for access to the railway infrastructure of different networks, the technical requirements for electrical compatibility and the procedures and acceptance criteria for demonstrating compliance with these requirements must clearly be defined and published. The EU has assigned the task to work out the mandatory technical specifications for interoperability (TSI) to a joint body representing the infrastructure managers, the railway companies and the industry. This joint body is the European Association for Interoperability (AEIF), set up by UIC, UNIFE and UITO. Together with the TSI's, registers of infrastructure and rolling stock will be compiled indicating the main features of each subsystem or part subsystem involved and the correlation with the features laid down by the applicable TSIs.

Given the importance of Electrical Systems Compatibility (ESC), the EU has funded three projects focussing on these aspects in the rail sector:

- ESCARV: Electrical Systems Compatibility of Advanced Rail Vehicles, Brite-Euram BE97-4097
- EMC Measurements in Railways, SMT4-CT96-2126
- EMC-ARTS: Electrical systems compatibility of Advance Rail Transport Signalling, G6RD-CT-2001-00647

The rail sector has shown great interest in applying the results from these projects and thus enabling it to provide better products and services. Consequently, the main partners of the aforementioned projects together with AEIF have chosen to participate in the ESC UserGroup project for the benefit of the industry.

2.2. Specific Project Objectives

The specific individual objectives of the ESC UserGroup Project are:

- To make a contribution towards the solution and avoidance of electrical system compatibility (ESC) problems, and hence have a beneficial impact on costs, reliability and safety of European rail systems and markets.
- To support AEIF in the preparation of electrical system issues for the mandatory technical specifications for interoperability (TSIs) on high speed and conventional rail.
- To support European railway operators and infrastructure managers in the preparation of the ESC specific part of the registers of infrastructure and rolling stock.
- To support railways, manufacturers, operators and research institutions in the production of railway equipment and demonstration of electrical system compatibility.

The project aims to achieve these objectives through the refinement and promotion of the ESC InfoBank tool developed during the European Commission funded ESCARV project. This tool is a relational database of ESC information relating to railway equipment and operations.

2.3. Strategic Contributions to the Growth Segment of the European Commission's Fifth RTD Framework Programme

In 1996, the European Commission has issued directive 96/48 on interoperability of high-speed rail systems. More recently, a similar directive on conventional railways has been proposed. To achieve interoperability, railways and railway industry need to harmonise the technical specifications, also in the field of electrical systems compatibility. With the proposed UserGroup and InfoBank, the project supports the rail sector in the preparation of the TSIs and in meeting these requirements.

The proposed project addresses specifically the following objectives and key actions of the "Growth" programme:

"to enhance the efficiency and quality of transport systems and services, to improve the overall cost-effectiveness and functioning of transport operations and infrastructure"

"to enhance interconnectivity and interoperability in order to promote efficiency in the transport system. This requires research addressing specifications for technical interoperability...and strategies to maximise their beneficial impact."

"improved performance for new and advanced vehicle infrastructure concepts. Improvements are sought of 30 to 50%"

"improved system competitiveness: halving of time to market and costs for the development of vehicle concepts and main infrastructure components. Further improvements trough the full co-operation between manufacturers, component suppliers and sub-contractors."

Key Action 3 (Land transport and marine technologies): Tools and procedures for the safe and reliable introduction of new technologies on rail vehicles and railway signalling and telecommunication systems

Key Action 1 (Innovative products, processes and organisation): Organisation of the ESC UserGroup, use of the InfoBank as an advanced information technology tool, computer modelling in an open framework

Key Action 2 (Sustainable mobility and inter-modality): support of the interoperability directives and of the preparation of 'Route Books' to define the technical criteria for access to the European railway networks

The project objectives are fully in line with the objectives of the EU Communication "towards a European Research area", namely:

to build a stock of material, resources and facilities optimised at European level

to provide a basis for sustained research and technological development for growth and employment

to establish a configuration to achieve the essential 'critical mass' in a major area of progress such as electrical systems compatibility, which up to now is fragmented within and between modes of transport

to establish a common system of reference for rail industry and operators as well as policy-makers concerned with interoperability, environment and safety

2.4. Relation to the Measures of the 5th Framework Call for Proposals

The ESC UserGroup project provides support for research infrastructures and boosts the productive use of RTD results by the whole European railway community. The results from previous and future European funded research projects in the field of ESC can be made available to all interested parties (railway operators and infrastructure owners, railway manufacturing industries, consultants and research institutes active in this field). The project also covers several types of actions (network, data banking, information exchange) which are best considered in a single project rather than separated into thematic network and support to data bases proposals. The proposal relates to the following measures of the open call:

Measure 3: Innovation support actions to promote and facilitate the diffusion, transfer, exploitation and broad use of results
The proposed UserGroup is an innovation support network. It promotes best practice in the field of railway ESC.

Measure 4: Awareness, assistance and information exchange actions
The InfoBank is the tool for the diffusion of information among the members of the UserGroup.

3. Scientific and Technical Performance,

3.1. Development of ESC UserGroup and ESC InfoBank

Presently the ESC UserGroup has 150 members. The ESC InfoBank has 2,210 information entries of which 461 are documents in Acrobat Reader format. Since the beginning of the project the ESC InfoBank has recorded 20,128 hits from members.

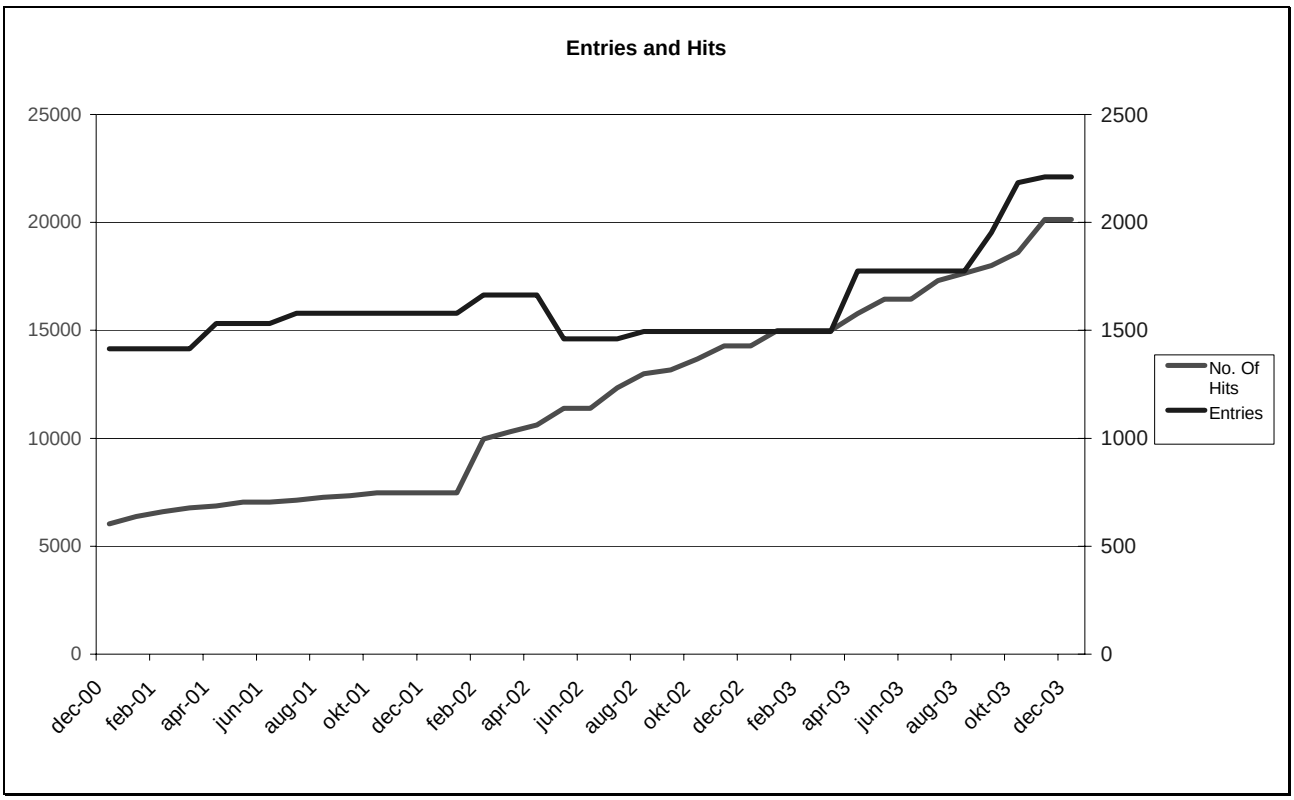

Table 1. Growth of ESC InfoBank Entries and "Hits"

The graph above shows the growth of both the ESC InfoBank contents and the number of “hits” the site received. Two points of note are the peculiar dip in the number of entries following the first tool update which combined many of the signalling system entries, and the increase in “hit” rates following the workshop events in Feb. 02 and Nov. 03.

3.2. Status of ESC UserGroup Work Packages

The work of the ESC UserGroup has been divided into 4 work packages with each work package lead by one of the 4 consortium partners.

Work package 1. Co-ordination – Bombardier Transportation Sweden AB

Work package 2. Networking – AEIF

Work package 3. Information Collection – CIRT, University of Genoa

Work package 4. ESC InfoBank development and maintenance – ENOTRAC AG

3.2.1. Work Package 1. ESC UserGroup Project Co-ordination

The objectives of Work Package 1 were to co-ordinate the reporting of the partners and to form a link between the project and the European Commission's Scientific Officer. Details of the project co-ordination activities can be found in 6. Management and Co-ordination Aspects.

3.2.2. Work Package 2. ESC UserGroup Networking Activities

Objectives of WP2

The objectives of WP2 were to promote the creation of the ESC UserGroup project and the potential benefits available to the European Railway industry. Through industry contacts and communication the partner responsible for WP2 would also construct a business plan for future operation of the ESC InfoBank and ESC UserGroup.

WP2 Deliverables included,

- D2 Organisation of 1st Workshop Event
- D3 Organisation of 2nd Workshop Event
- D4 Develop draft business plan for permanent operation at mid term point
- D5 Develop final business plan for permanent operation at conclusion of project

Results Achieved

The AEIF has completed the following activities as part of it's networking and communication role in the ESC UserGroup project.

- Organised and hosted the 1st ESC UserGroup Workshop event on 5th February 2002. 83 individuals representing a diverse range of European manufacturers and operators attended the workshop. The workshop included 12 presentations on ESC topics affecting European railways including the ESC UserGroup and ESC InfoBank; railway ESC technical phenomenon and developments in railway ESC regulations and standards.
- Organised and hosted the 2nd ESC UserGroup Workshop event on 6th November 2003. 52 individuals representing a diverse range of European manufacturers and operators attended the workshop. The workshop included 12 presentations on ESC topics affecting European railways including the ESC UserGroup and ESC InfoBank; railway ESC technical phenomenon and developments in railway ESC regulations and standards. Following the presentations a debating session was held to discuss the future role and survival of the ESC InfoBank and ESC UserGroup
- Publication of the 1st and 2nd ESC UserGroup Workshop proceedings on CD and distribution to attendees.
- Development of the Draft Business plan for continued operation of the ESC UserGroup beyond June 2003
- Participated at project partner and steering board meetings.

ENOTRC AG has performed the following additional networking activities.

- Considerable effort was made to re-activate the members of the UserGroup after the interruption and to take key players on board in a more active role. After a special presentation of UserGroup and InfoBank, SNCF agreed to participate as member of the Steering Board and to become actively involved in the strategy of InfoBank and UserGroup.
- ENOTRAC presented UserGroup and InfoBank to the CENELEC Survey Group for the definition of signalling interference limits on Trans-European routes. Alan Knight from Alcatel (Signalling) chairs this Survey Group.

- ENOTRAC was invited by the EC to chair the EMC session at the surface transport conference in Valencia in June 2002. ENOTRAC has supported the Project Co-ordinator, Bombardier Transportation, in the preparation of an exhibition stand for this conference. A special model was built to illustrate the problem of interference to signalling systems caused by traction vehicles.
- In support of information module M11, 15kV 16.7Hz systems, ENOTRAC attended the meeting of 15kV railway operators at Amsteg, Switzerland, and presented the latest developments of the ESC InfoBank and ESC UserGroup, the meeting was held in August 2003.
- ENOTRAC was asked to present the work of the ESC UserGroup project at the UIC / ERRI meeting to prepare proposals for the European Commission's 6th Framework Programme.
- From this meeting ENOTRAC were asked to coordinate the proposal of a new European research project on EMC as part of the planned integrated project INTERACT. Part of this new proposal included a business plan for the future operation of the ESC UserGroup and ESC InfoBank. This proposal was intended to become final business plan deliverable, D5, of WP2. Unfortunately the INTERACT proposal was rejected by the Commission's selection committee and so no final business plan document is available.
- In place of deliverable D5, an emergency plan for continuation of the ESC InfoBank and ESC UserGroup for 2 years has been created. Through this plan ENOTRAC will continue to provide access to the ESC InfoBank until December 2005. During this time however, little will be done to further grow or update the contents of the database without extra funding. Leading railway companies and organisations have been contacted regarding support for this arrangement but it is not critical that support is received for this plan to be realised.

The promotion activities below were performed by Bombardier Transportation at the invitation of the European Commission.

- Preparations of materials for an exhibition stand at the Commission's Surface Transport Technologies conference in Valencia, Spain, on 4-6th of June 2002.
- Delivery of a presentation on the ESC InfoBank, A Tool for Everyone at the Commission's Surface Transport Technologies conference in Valencia, Spain, on 4-6th of June 2002.

Conclusions from WP2

The networking activity of the ESC UserGroup project has had mixed success. From the beginning many organisations expressed vocal support for project and declared intentions to participate, particularly from the network owners. Most often however this support has not materialised and little financial or human resource has been forth coming from this section of the industry to support ESC UserGroup objectives. On the other hand the railway manufacturers sector has offered staunch support to the project and particular mention must go here to Bombardier Transportation, Alstom Transportation and Siemens Transportation Systems.

Part of the problem of networking appears to be that many technical people understand the issues as they are continually presented with them on a daily basis but this message is not picked up on by railway organisations management. The networking activities of the project have forged close links between the technical staff of different railway organisations and this has benefited the communication and the consolidation of industry views and strategies. Unfortunately this network has remained at the technical level and little of the opinions and issues developed have made it up to the political and strategic levels of the European railway industry. This network of technical experts and goodwill has been one of the most powerful results of the ESC UserGroup project and ESC InfoBank.

The task of networking has also brought into reality the power structure of the European rail industry. Much of the efforts of the networking have gone into building links to the French and German national operators, SNCF and DB, and the major railway organisations UIC, AEIF and

UNIFE. Despite all efforts none of these organisations has taken on board the messages or realities promoted by this project. This has at times been an impossible task and unfortunately one which this project has not found an answer for.

The inability to secure political and strategic support has been the biggest failure of the ESC UserGroup and the risk now is that the momentum and lessons learnt during the previous 30 months will stagnate and be lost.

Much effort was placed into the writing of the EMC sections of the INTERACT project proposal and it was hoped that this would be the basis of the final business plan for the continued operation of the ESC InfoBank and ESC UserGroup. Unfortunately the INTERACT proposal was turned down and the project did not have any reserve business plan to fall back on.

Whilst the AEIF has been a strong partner and supporter of the concept of the ESC InfoBank and ESC UserGroup a strong focus on the need to further develop TSIs and lack of available resources in the organisation for other tasks has meant that AEIF has not been able to fully meets it's commitments to the ESC UserGroup project.

3.2.3. Work Package 3. Information Collection and Checking

Objectives of WP3

The objective of WP3 was the allocation and collection of information modules to sub suppliers. Information collection for the ESC InfoBank is co-ordinated by the University of Genoa but ENOTRAC AG is also responsible for the collection of 3 information modules and assists in the collection and allocation of ESC UserGroup membership "information fees"

WP3 deliverables included,

- D6 Plan for the collection of information
- D7 Training of suppliers of information modules
- D8 Specification of individual modules contents
- DM1-12 Collection of 12 information modules from suppliers

Results Achieved

During the project CIRT has performed the following activities.

- Contacted potential subcontractors for contribution to information modules, drafted the subcontracts, and worked on the templates and training course preparation.
- An on going activity in WP3 concerning the definition of the sub-contracts was the delivery of two training courses in Genoa for the following subcontractors:
  - Training course for Modules M9, M10, M14, M15 for Warsaw University and Omegati S.r.l
  - Training course for Modules M3, M4, M13 for RFI-FS and AEA Technology
- Each training course lasted one day and the subcontractors received documentation for helping in the template preparation and demos for the data base navigation and search activities.
- Subcontractor returned information templates checked by CIRT and passed on to ENOTRAC for entry to ESC InfoBank.
- Concerning dissemination activities CIRT participated actively at both ESC UserGroup Workshops events.
- CIRT also participated in discussions and inputs regarding the development of the draft business plan and final business plan for continuation of the project.

- CIRT staff participated at the Steering Board and partner meetings

Information collection activities performed by ENOTRAC AG during the project have included,

- Suppliers for the information packages have been searched for the Swiss proportion of the subcontracts. An agreement was reached with the Swiss Federal Office of Transport and with Bombardier Transportation (Switzerland) for the supply of information relevant for the access to the railway infrastructure in the countries electrified with 15kV, 16.7Hz, such as Switzerland, Germany, Austria, Sweden and Norway.
- ENOTRAC managed the collection of information to be contributed as membership fees from ESC UserGroup members. This tactic has been partially successful during the project and about one third of members have responded and made their contribution.
- Special agreements have been negotiated with large organisations for a package of information as a 'membership fee' for a group of users. Agreements have been reached with London Underground and Alstom Transportation
- Information updates have been added to the ESC InfoBank from three different sources
  - Information available at ENOTRAC, either from the ESCARV project or from other sources
  - Information supplied by subcontractors, through CIRT and ENOTRAC
  - Information supplied by candidates as membership fee.

Information Module Results of WP3

The information modules are listed here as they are in the project proposal paperwork, Ref #3.

Information Module	EMC/ESC Requirements for Access to National Railways Networks: Banverket (S), NSB (NO), DSB (DK), RHK (FI)	M1
Supplier	BAV & Bombardier Transportation	
Results	Information on Danish power suppliers and signalling systems and Swedish power supplies. Nothing on Norway	

Information Module	EMC/ESC Requirements for Access to National Railways Networks: DB (D)	M2
Supplier	BAV & Bombardier Transportation	
Results	Little information received on interference limits	

Information Module	EMC/ESC Requirements for Access to National Railways Networks: FS (I), OSE (GR)	M3
Supplier	RFI / Omegati / Holland Railconsult	
Results	Information on Italian 25kV power supply, BACC system, signalling devise and authorities. Signalling information for OSE	Also included some general inputs relating to TSIs and other European projects

Information Module	EMC/ESC Requirements for Access to National Railways Networks: Railtrack/Network Rail (GB), IE (IE)	M4
Supplier	AEA Technology	
Results	Information on compatibility with signalling systems and power supplies	UK only

Information Module	EMC/ESC Requirements for Access to National Railways Networks: RENFE (E), CP (P)	M5
Supplier	Holland Railconsult	
Results	Info. received on signalling systems for RENFE and CP and some on power supplies for RENFE.	

Information Module	EMC/ESC Requirements for Access to National Railways Networks: SBB (CH), ÖBB (A)	M6
Supplier	BAV & Bombardier Transportation	
Results	Information on power supplies and signalling systems for ÖBB and power supplies only for SBB and BLS (Swiss)	

Information Module	EMC/ESC Requirements for Access to National Railways Networks: SNCB (B), NS (NL), CFL (LUX)	M7
Supplier	Holland Railconsult	
Results	Information on power supplies and signalling systems for SNCB, NS and CFL.	

Information Module	EMC/ESC Requirements for Access to National Railways Networks: SNCF (F)	M8
Supplier	SNCF	
Results	No information received	

Information Module	EMC/ESC Requirements for Access to National Railways Networks: New EU member states (PL, CZ, SL,…)	M9
Supplier	University of Warsaw	
Results	Information relating to power supplies, signalling systems, vehicles, operators and national requirements.	Poland, Czech Republic and Slovakia

Information Module	EMC/ESC Requirements for Access to National Railways Networks: Other countries. (UA, RUS, TRK, ROM, …)	M10
Supplier	University of Warsaw	
Results	Information relating to power supplies, signalling systems, vehicles, operators and national requirements.	Russia, Estonia, Lithuania, Latvia, Slovenia, Croatia, Hungary, Ukraine and Byelorussia

Information Module	Data and Characteristics of Electrification Systems: 15kV 16⅔Hz	M11
Supplier	BAV & Bombardier Transportation	
Results	Information on Austrian, Swiss and Swedish power supplies received	

Information Module	Data and Characteristics of Electrification Systems: 25kV 50Hz	M12
Supplier	SNCF	
Results	Some details received on Danish systems through BAV & Bombardier Transportation	

Information Module	Data and Characteristics of Electrification Systems: DC	M13
Supplier	RFI / Omegati	
Results	Information received on Eastern Europe DC systems by Uni. Warsaw	

Information Module	Collection of All Documents, Information and Tools Developed or Used in ESCARV.	M14
Supplier	Omegati	
Results	Lists of the models available form the ESCARV project for modelling of track circuit receivers, AC and DC power supplies, pantographs, high and low frequency transmission lines along with case studies and test results.	

Information Module	Survey of Calculation Methods, Models and Tools Used for EMC/ESC Assessment in Railway Systems	M15

Supplier	Omegati	
Results	Information on software packages and tools applicable to the calculation of ESC problems. Including links to text books, case studies, suppliers etc.	

Collection of Informaiton Fees from ESC UserGroup Members

The original plan for the ESC UserGroup was that membership would not depend upon payment of a financial fee but rather the payments could be made in information. This concept had a number of benefits;

- Members did not require financial authority from higher management to participate
- Members could contribute with their own specialist knowledge which could be difficult to obtain by individually contacting organisations from the project side.
- The “information fee” could also include the review of existing database contents and thus a mechanism to ensure the accuracy of ESC InfoBank contents was created.
- For the partners there was less administrative costs as there was no requirement to manage financial transactions from members.

Upon reflection the concept has proven to have both advantages and disadvantages. Where “information fees” have been paid by members they have proven to be extremely good and it is unlikely that they could have been obtained in any other way.

The possibility to participate in the ESC UserGroup without the requirement of any financial payment has definitely been an attraction to membership.

Unfortunately far fewer ESC UserGroup members have paid the fee than expected and very few have chosen to review the existing contents in order to ensure the accuracy of information. It appears to be easier for members to contribute something from their own specialist area rather than to review existing content of which they may have knowledge but not consider themselves to be competent enough to comment on.

Conclusions of WP3

The major conclusion of WP3 was the unexpected amount of effort required to gain access to the national railway owners’ systems ESC requirements. Even with the lure of financial compensation for their efforts and additional pressure from the European Commission to support the ESC UserGroup project the response and attitude of the national network owners was disappointing to say the least.

For the packages of information given to companies which were not the national infrastructure owner the situation was no better. For these organisation tasked with collecting information the results were even more difficult to obtain as they did not even have the motivating power of money to assist them. This situation tended to occur where a consultant or company had agreed to collect information covering several smaller European countries.

Even where operators were cooperating with the information collectors, the quantity and quality of information was not as expected. It appears that virtually all of Europe’s national network owners have very poor asset registers and rely upon outdated and inadequate standards to present their ESC requirements to suppliers.

It is interesting to note however that information was much easier to obtain relating to the new member state railways of Eastern Europe that those of the existing member countries. Significant contributions of information were made for modules M9 and M10.

3.2.4. Work Package 4. ESC InfoBank Development, Operation, Maintenance and Administration

Objectives of WP4

The objective of WP4 was to manage the entry of new information to the ESC InfoBank and to further refine the tool following feedback from members of the ESC UserGroup.

WP4 deliverables included,

- D9 Updates of ESC InfoBank with new data
- D10 Internet site for ESC UserGroup
- D11 ESC InfoBank tool upgrade 1
- D12 ESC InfoBank tool upgrade 2
- DM13-DM15 Collection of 3 information modules from suppliers

Results Achieved

During the project the following technical progress has been made by ENOTRAC.

- The ESC InfoBank has been kept operational from January 2001 to avoid an interruption between the end of the ESCARV project and the delayed start of the ESC UserGroup project. The ESC InfoBank was therefore fully operational from day one of the ESC UserGroup project. See www.esc-infobank.com .
- The second deliverable, the development and launch of a project web site, could also be met. The web site www.esc-usergroup.org was operational in the second half of September 2001. Following the completion of the ESC UserGroup project this web site will now be decommissioned.
- ENOTRAC supported the preparation and performance of both ESC UserGroup workshops at the UIC conference facilities in Paris. In addition to a presentation and demonstration of the ESC InfoBank to the audience, computers with Internet access were installed in the lobby where the participants could test the InfoBank with specialist support from ENOTRAC staff and the other consortium partners.
- Two updates of the functionality of the ESC InfoBank tool and user interface have been made during the project. The biggest significant modification to the user interface resulted in the ability to present an overview of all interference requirements of a railway infrastructure (e.g. the 25kV network in France), either in tabular or in graphical form. The second upgrade improved more of the administrative functions of the ESC InfoBank tool allowing tracking of information fees from ESC UserGroup members.
- New members have been given access to the InfoBank. In total, approximately 40 new members have joined the UserGroup since the start of the project.
- The IT infrastructure for the operation of the ESC InfoBank and the web site of the ESC UserGroup has been maintained and upgraded to keep pace with the technological development in that field. The computer used for the entry of data in an MS ACCESS database had to be replaced by a more powerful machine. The speed of the fixed data link from the web server to the Internet provider has been doubled to improve performance. A firewall has also been added on the web server to improve security.

Conclusions of WP4

Work package 4 has gone very smoothly. Internet access to both the ESC UserGroup and ESC InfoBank sites has been uninterrupted throughout the duration of the project and the 2 upgrades to the ESC InfoBank tool have been completed as planned.

Data entry to the database has been intermittent rather than systematic but this reflects more the problems and delays of information collection than any difficulty of actually transferring the data into the database.

The biggest workload on the ESC InfoBank administrator has been the handling of the information fees. This has required communication with each user and the individual agreement on a suitable information fee, together with CIRT, leader of WP3-Information Collection, and its subsequent collection. The submission of information fees has been intermittent with some members buying into the concept easily and delivering on time their contribution whilst other members appear to have ignored the fact that the ESC InfoBank is intended to operate on a “give and take” basis rather than a “take only” format.

4. List of Deliverables

The table below shows the full list of the planned deliverables for the ESC UserGroup Project and their status at the end of the contract.

4.1. Table of Planned Deliverables

Delivera -ble No.	Title and nature of the Deliverables	Status
D1	Commercial agreement for info suppliers: Template for commercial agreement to be made with each supplier of information as specified in modules M1..M15	Completed as planned
D2	Event 1: Organisation and performance of the first networking event for User Group members. Invitation, agenda, speakers, facilities, moderation of the workshop, follow-up activities, e.g. evaluation of feedback	Completed as planned. Workshop held on 5th February 2002,
D3	Event 2: Organisation and performance of the second networking event for UserGroup members as for event 1	Completed as planned. Workshop held on 6th November 2003,
D4	Draft Business Plan for permanent operation of UserGroup and InfoBank as activity of the rail sector	Completed as planned. Submitted with Mid-Term Report, UG2-001, ESC InfoBank Business Plan
D5	Business Plan for permanent operation of UserGroup and InfoBank as activity of the rail sector	Completed but not successfully. Intention was that the INTERACT project would carry ESC UserGroup and ESC InfoBank forward but this proposal was unsuccessful.
D6	Plan for the collection of information: what information is needed, who can supply it and when. To be agreed with suppliers of modules M1..M15	Completed as planned
D7	Training of suppliers of information: how to structure information, how to fill in EXCEL templates, how to access and check the information via Internet. Two training sessions are foreseen early in each year of the project.	Two training sessions completed as planned. Lack of suppliers meant that the remaining planned training sessions were not required.
D8	Specification of modules. This is to be done individually for each of the modules M1..M15: Definition of information to be supplied, allocation of module to a supplier, definition of time scales (in accordance with the plan for collection of info).	This has been completed although for some parts of information modules a suitable supplier was never located.

Delivera -ble No.	Title and nature of the Deliverables	Status
D9	InfoBank updates: Update of the InfoBank every month to make newly entered information available to all users. Updates do not include new functions of the tool.	Completed. Not performed as regularly as planned although the rate increased as the flow of information increased in the last months of the project.
D10	Internet Site for the UserGroup.	Completed as planned
D11	InfoBank tool upgrade1: Upgrade of the tool to implement new functions (e.g. user interface, reports, search functions). Upgrade 1 will consider feedback from event 1.	Completed as planned
D12	InfoBank tool upgrade2: Upgrades of the tool to implement new functions (e.g. user interface, reports, search functions). Upgrade 2 will consider feedback from event 2.	Completed as planned but ahead of workshop event 2 due to the postponement of this event.
DM1	Package of information: Sweden, Norway, Denmark & Finland	Reorganised with DM6 & DM11. Work split between BAV and Bombardier Transportation (Switzerland). Information received for Sweden and Denmark
DM2	Package of information: Germany	Reorganised with DM6 & DM11. Work split between BAV and Bombardier Transportation (Switzerland). Some limited information received
DM3	Package of information: Italy, Greece	Work completed by Omegati S.r.I. (Italy) & Holland Railconsult (Greece)
DM4	Package of information: UK, Ireland	Half of work package delivered by AEA Technology
DM5	Package of information: Spain, Portugal	Work completed by Holland Railconsult
DM6	Package of information: Switzerland, Austria	Work completed by Bombardier Transportation (Switzerland) Information received on electrification and signalling
DM7	Package of information: Belgium, Netherlands, Luxembourg	Work completed by Holland Railconsult
DM8	Package of information: France	Small contribution from SNCF

Delivera -ble No.	Title and nature of the Deliverables	Status
DM9	Package of information: EU new candidate countries	Work completed by Warsaw University
DM10	Package of information: Other countries	Work completed by Warsaw University. Spilt into two packages, DM10 and DM1.1& 1.2
DM11	Package of information: Electrification- 15kV 16.7Hz	Work completed by Swiss Federal Office of Transport (BAV) Information received for systems in Sweden, Switzerland and Austria
DM12	Package of information: Electrification- 25kV 50Hz	Small contribution from SNCF
DM13	Package of information: Electrification- dc systems	Work completed by Omegati S.r.l.
DM14	Package of information: Transfer of ESCRV results	Work completed by Omegati S.r.l.
DM15	Package of information: Electromagnetic analysis tools	Work completed by Omegati S.r.l.

4.2. Table of Unplanned Deliverables

In addition to the planned deliverables a number of unplanned tasks have had to be completed. The table below lists the unplanned tasks and associated deliverables.

Delivera -ble No.	Title and nature of the Deliverables	Status

D13	Leaflet produced including application form for ESC UserGroup membership	500 leaflets printed for distribution
D14	Individual presentation in French to SNCF, Paris.	Secured SNCF support and participation in Steering Board
D15	Presentation of ESC InfoBank for 1st Workshop Event	Delivered as planned at 1st Workshop
D16	Construction of track circuit signal interference model for demonstration at EC Valencia conference	Displayed in Valencia, 3rd-5th June 2002
D17	Preparation of exhibition stand poster materials and ESC InfoBank presentation for EC Valencia conference	Delivered in Valencia, 3rd-5th June 2002
DM1.2	Package of information: Hungary, Croatia, Slovenia, Ukraine, Byelorussia	Work completed by Warsaw University
DM1.1	Package of information: Greece	Work completed by Holland Railconsult

5. Comparison of Planned Activities Against Work Actually Performed

The ESC UserGroup project was intended to commence on the 1st of January 2001 following on immediately from the ESCARV project. Unfortunately delays in the completion and signing of the between the partners and the European Commission meant that the project was delayed until the 1st of July 2001. The project plans below outline the intended timescales and deadlines for the different project deliverables.

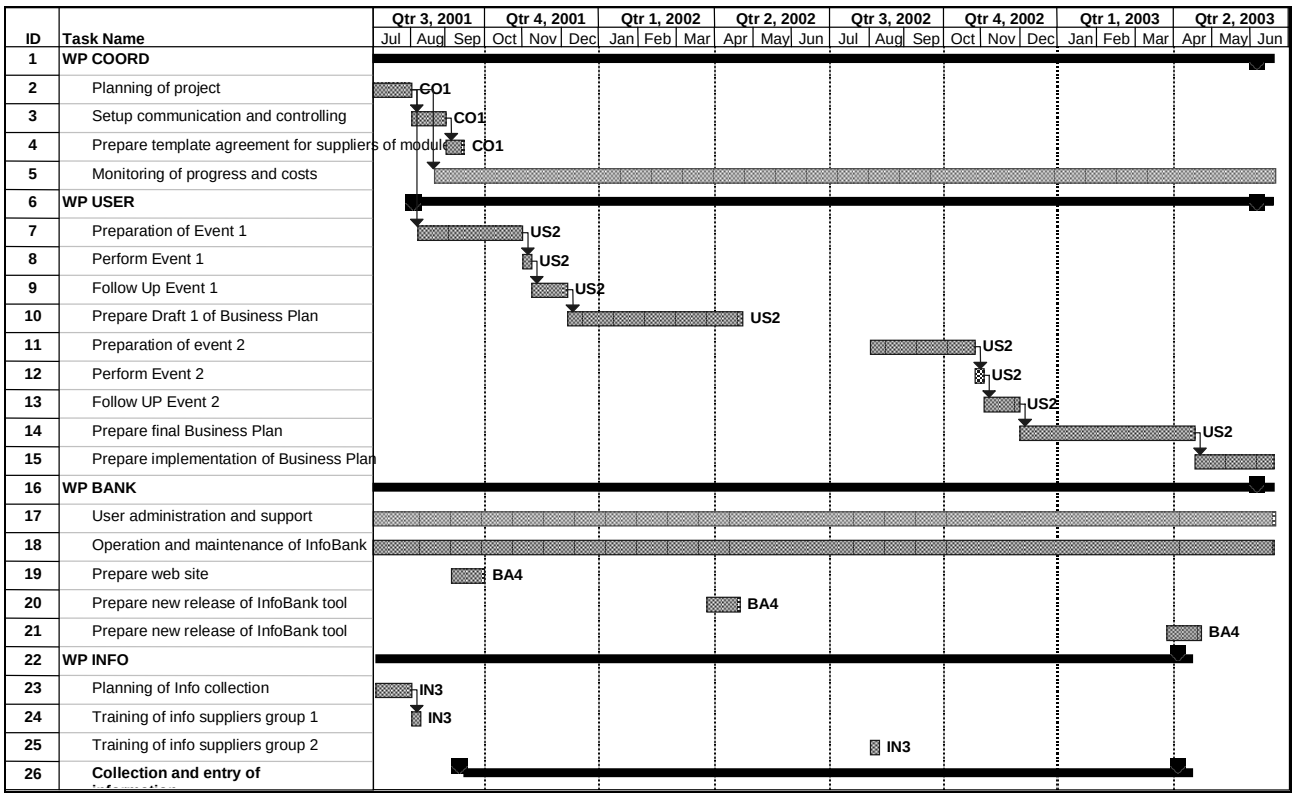

Figure 1. Planned Timescales

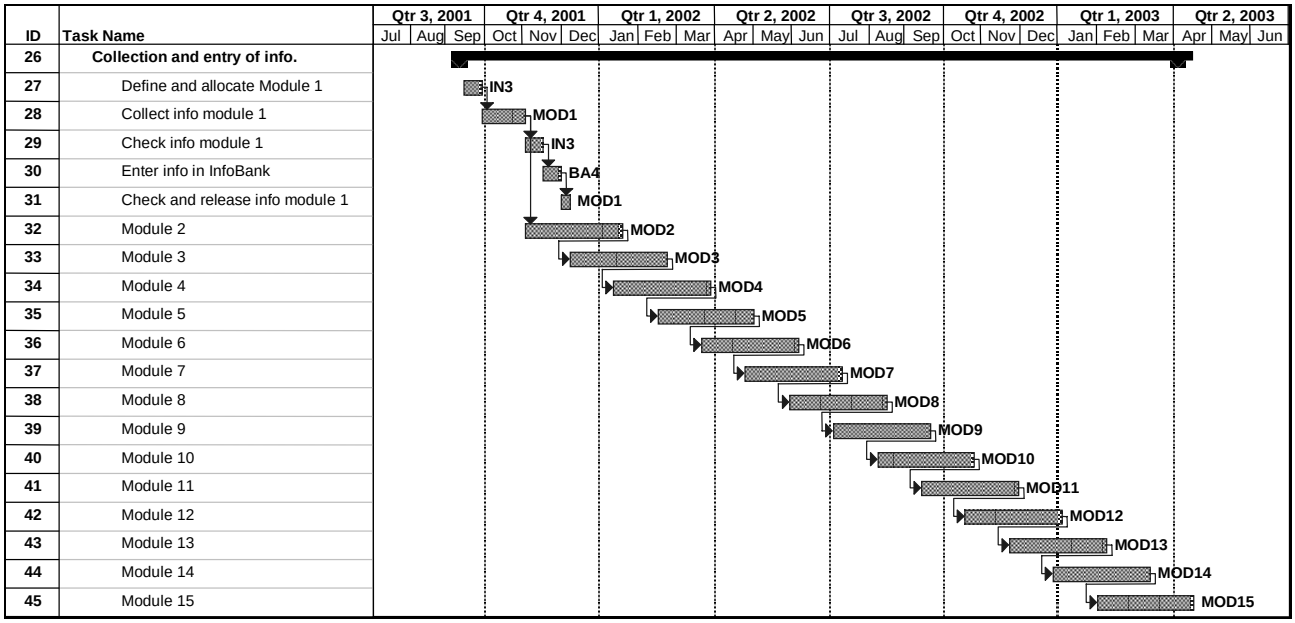

Figure 2. Planned Timescales (cont)

The actual progress of the project is represented in the following project plans. The biggest difference is the extension of the original project timescale by 6 months. This 6 month extension was requested just after the mid-term point when it was realised by the project partners that it would be unable to deliver the expected project results in the original time frame and so an extension would be necessary.

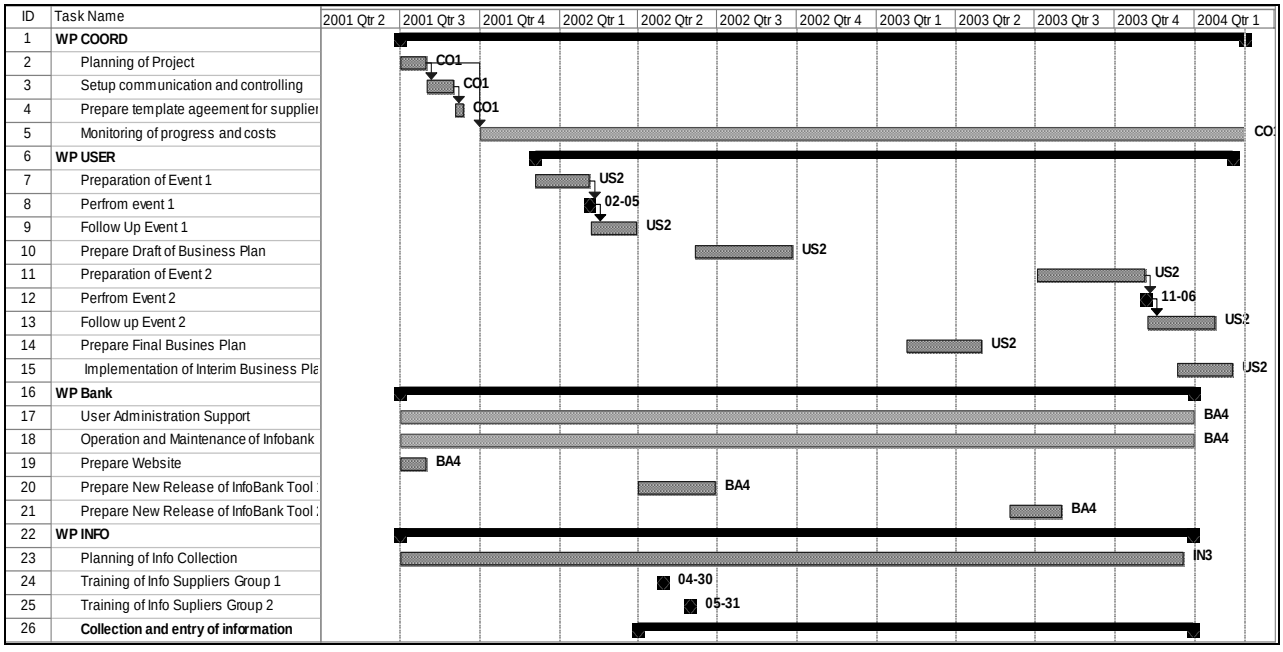

Figure 3. Actual Timescales

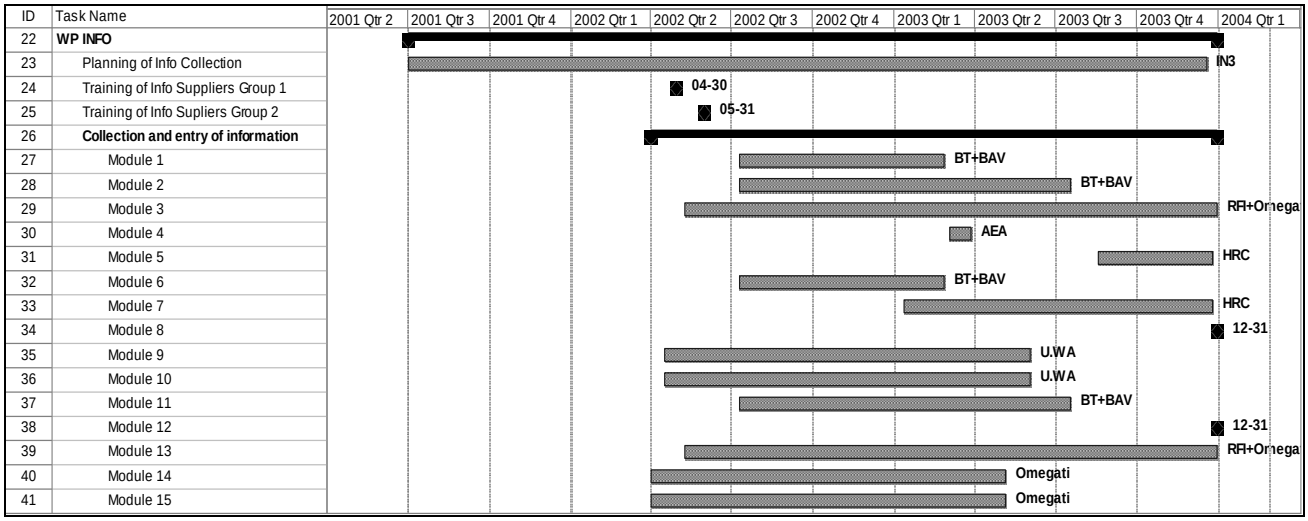

Figure 4. Actual Timescales (cont.)

5.1. Information Modules

The collection of information modules was considerably more laborious than has been expected. From the beginning of the project it was assumed that there would be continued momentum from the ESCARV project and thus we could exploit the existing contacts to help identify and secure information suppliers. It was also hoped that the offer of a sum of money to gather information would stimulate interest.

Following the delayed start of the project some momentum from the ESCARV project had been lost but it seemed that many organisations were interested and vocally supported the aims of the ESC UserGroup project. However, when the time actually came it was difficult to actually locate contact people in the different organisations who were interested to actually sign a information supply contract. In many instances it took almost as long to progress through the supplier's bureaucracy and formally sign the contract as it did to actually gather the information.

In an attempt to motivate the information owners, the project received backing form the European Commission in the form of a letter which was circulated to problematic organisations reminding them of the objectives of this project and their obligations towards the establishment of a Trans European Network.

5.2. Workshops

The two workshops have been highlights of the ESC UserGroup project. These were performed as part of WP2-Networking and come under the scope of the AEIF. Due to resource issues at AEIF these deliverables were actually subcontracted out to European Railway Services, part of the ERRI organisation.

The timings of the two workshops has differed form those originally planned but in both instances this has resulted in more sensible outcomes.

The first workshop was planned to take place 5 months into the project but was actually held approximately 3 months late. This delay was beneficial as it provided more time to promote the project and build momentum. In the end this resulted in a bigger and better attended workshop than would have occurred had the workshop been held 5 months into the project as planned originally.

The running of the second workshop was linked closely to demonstration of the project results and the final business plan. Owing to the slow rate of information collection and collapse of the final

business plan based on the INTERACT proposal, the inevitable consequence was that the running of the second workshop was also delayed. In the end with time running out and only part of the deliverables completed it was necessary to hold the event before the project contract concluded. By holding the running of the second event until as late as possible we were able to demonstrate that some progress had been made in this project and the majority of the intended deliverables completed.

5.3. Networking and Promotion

Initially it was hoped that the ESC UserGroup project could follow on directly from the ECARV project. This way we could keep the momentum and contact network established over the previous three years work. Unfortunately this was not to be and the contract for the ESC UserGroup was only completed in June 2001. This meant that at the launch of the ESC UserGroup the project partners had to perform another round of promotion and networking activities in order to renew contacts and regain momentum.

Part of this effort was to meet with key railway players, such as SNCF and SBB, to re-galvanise their interest and backing for the project. During this time the project was able to build an impressive steering board including major manufacturers and railway operators.

An additional unplanned activity was the production of 500 ESC UserGroup leaflets. These were then used to promote the project and its ambitions at industry events such as InnoTrans and WCRR.

Through out the project partners took the opportunity to promote their work through presentations at industry events such as WCRR, the European Commission's Surface Transport Technologies for Sustainable development Conference, InnoTrans, etc. This helped keep awareness of the project alive and often lead directly to new applications for ESC UserGroup membership.

5.4. Upgrade of ESC InfoBank tool

Twice in the project, it had been planned to perform and upgrade of the ESC InfoBank tool. Using the workshop events to gather feedback it was planned to incorporate any suggestion from the ESC UserGroup members which were reasonable and feasible.

Some comments were collected at the first workshop event but overall the feedback for the tool was positive. The major change at the first upgrade was to new ability to display the signalling systems of entire infrastructure areas in a single graphical or tabular format.

As the general feedback form the first workshop event was positive and not many ideas for improvement had been received, the second tool upgrade focused on improving the administrator functions of the tool. Most of these refinements were aimed at making it easier for the administrator to manage the entry of data and the management of information fees from the individual ESC UserGroup members.

5.5. Creation of Business Plan / INTERACT Proposal

In the original project proposal the deliverables relating to the draft and final business plan for future operation of the ESC UserGroup and ESC InfoBank were under the responsibility of AEIF in WP2.

As has previously been mentioned there have be resource difficulties within AEIF and so only the initial draft business plan deliverable has been completed.

The final business plan was actually organised by ENOTRAC and called for the ESC InfoBank and ESC UserGroup to become the chosen dissemination tools for the newly proposed Sixth Framework Programme Integrated Project, INTERACT. Inclusion of these two instruments in this project would have secured their future application for at least another 5 years.

Unfortunately the INTERACT proposal was unsuccessful. Through feedback obtained from the proposal reviewer panel it appears that the EMC section, including ESC InfoBank and ESC Use4rGroup, was well received but that the overall project proposal failed due to inadequacies in other areas of the proposed work and overall project cohesion.

5.6. Coordination Activities

Generally the coordination activities of the project have gone according to plan. Two aspects have however lead to some deviations from the originally planned activates.

The first deviation was the requirement to request a 6 month extension of the project from the European Commission. The extra time lead to additional activities on behalf of the coordinator such as amendments to the original contract and an additional set of reporting of cover the 6 month extension.

The other coordination activities which deviated from the plan were the amount of project meetings required by the partners. Due to the contract extension and the efforts to keep momentum all partners have significantly exceeded their planned travel budgets for the project through participating at the different project and steering board meetings and promotional events.

6. Management and Co-ordination Aspects

The management and co-ordination aspects of the ESC UserGroup project are combined into Work Package 1. COORD and performed by Bombardier Transportation Sweden AB.

The activities completed by Bombardier in this role have included

- Completion of all contractual paper work between the consortium partners and the European Commission.
- Completion of the ESC UserGroup member license document.
- Distribution of funding payments from the European Commission to the consortium partners.
- Payment of information sub-contractors for delivery of information modules.
- Publication and distribution of 6-monthy ESC UserGroup newsletters.
- Introduction and presentation at the 1st ESC UserGroup Workshop in Paris, 5th February 2002.
- Introduction and chair of debating session at the 2nd ESC UserGroup Workshop in Paris, 6th November 2003.
- Presentation of ESC UserGroup and ESC InfoBank at EC Surface Transport Technologies Conference in Valencia, Spain, 4th June 2002.
- Preparation and organisation of posters and exhibition stand for the ESC UserGroup project at EC Surface Transport Technologies Conference in Valencia, Spain, 4th June 2002.
- Link to the EC supported project EMC-ARTS, Contract Number G6RD-CT-2001-00647, investigating ESC in the new ERTMS signalling system. The intention is to disseminate EMC-ARTS results through ESC InfoBank for use in the European Community and Switzerland.
- Negotiation of a 6 month project extension with the European Commission.

6.1. ESC UserGroup Project Structure

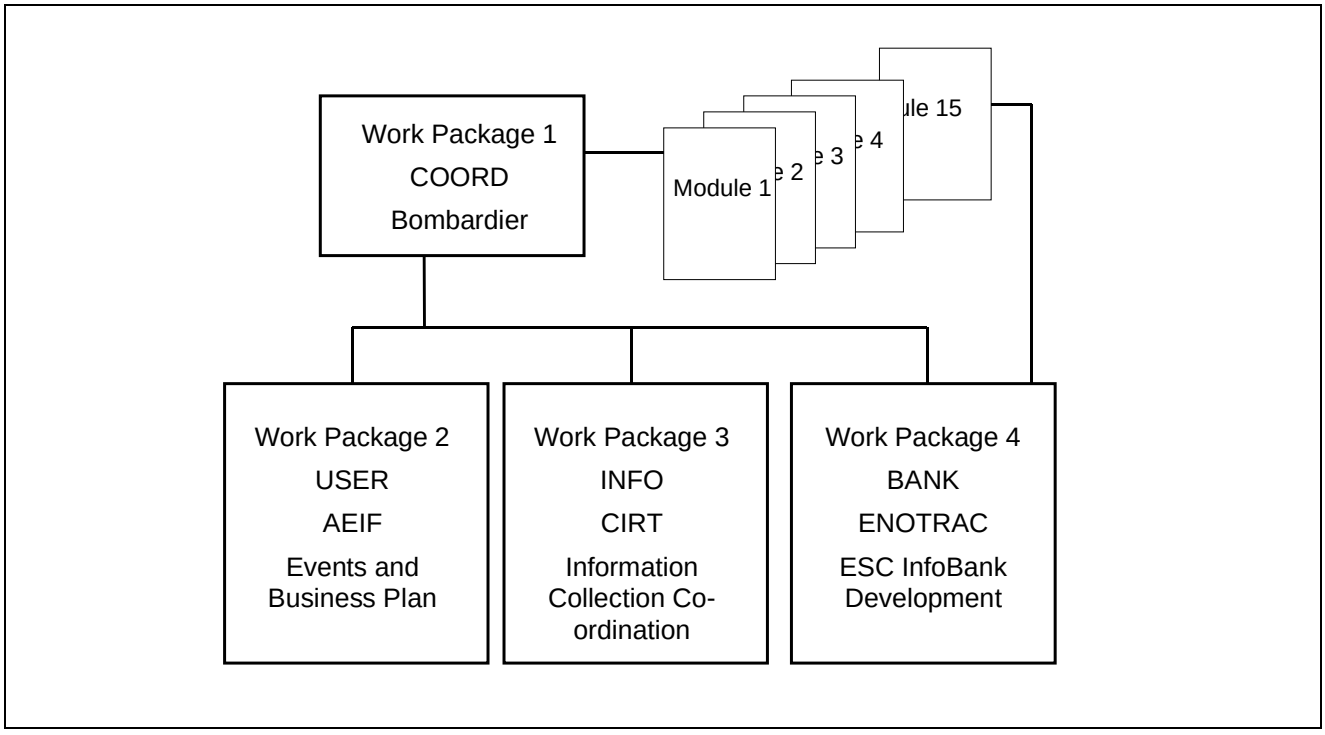

Figure 3. Diagram of ESC UserGroup Work Packages.

Modules 1-15 are assigned through sub-contracts split between Bombardier Transportation Sweden AB and ENOTRAC AG. The split is roughly 12 modules and 3 modules respectively.

The performance of the consortium from the coordination perspective has been good and a harmonious and positive working environment has been maintained throughout the project duration. Motivation and support has been strong from all partners but unfortunately in the case of AEIF this support has not been met by resources. This lack of available resource from AEIF has meant that the intended deliverables form WP2 have not all be completed successfully.

Contributions from WP3, CIRT, and WP4, ENOTRAC, have all be met and in the case of ENOTRAC the contributions to the overall project have greatly exceeded those set out in the original project proposal.

Communication in the project has been very good through regular meetings; however as a consequence of this good communication, the travel budget for the project has been significantly exceeded. It would have been difficult, from a co-ordination perspective, to maintain project momentum without these meetings and certainly the project would have suffered if travelling and the number of meetings had been reduced. With hindsight it may be possible to say that the intended travel budget in the proposed project budget has been too small.

Communication and support from the European Commission for this project has been exceptional. The project scientific officer has monitored the project's progress closely and always made himself available, where possible, to the project partners. Barring the original delay in signing the project contract, the financial and contractual aspect of the project have been run very smoothly and the dialogue between the project and the Commission open and honest.

6.2. ESC UserGroup Steering Board

In addition to the consortium of 4 project partners a steering board of industrial representatives was created to assist the project. The steering board originally consisted of 7 members representing railway manufacturers and infrastructure owner. The number of steering board members was also selected to give a good structure when it came to any issues which required voting. The only occurrence of steering board voting employed was to approve the inclusion in the ESC UserGroup of applicants who applied from countries or organisation based outside of the European Union and its associates.

Following the 1st workshop event Alstom Transportation indicated that they would also like to participate in the project steering board. It was agreed therefore that Alstom Transportation could join the steering board as a non-voting member. Following their inclusion Alstom have also supported the project strongly and regularly attended the steering board meetings.

The project steering board members are:

AEIF	*Deutsche Bahn (DB)*
Alstom Transportation	*ENOTRAC*
Bombardier Transportation	*Siemens Transportation Systems*
CIRT	*Société Nationale des Chemins de fer Francais (SNCF)*

Initially the steering board functioned well but as time progressed it became clear that the commitment of SNCF and DB was not as strong as first anticipated. In fairness to SNCF their representative had to step down due to ill health but a replacement was never offered. With DB, despite consistent invitations from the project they always claimed to have more pressing business or no authority to travel and never actually attended any of the steering board meetings.

6.3. Names and Contact Details of Partners

Coordinator	Partner #1
Stuart Shirran, Bombardier Transportation, Östra Ringvägen 8A, S-72173 Västerås. Sweden. Tel. +46 21 317466 Fax.+46 21 130299 eMail: stuart.shirran@se.transport.bombardier.com	Dr. Werner Breitling, AEIF, 16, rue Jean Rey, F-75015 Paris. France. Tel. +33 1 44 492090 Fax. +33 1 44 492099 eMail : breitling@uic.asso.fr
Partner #2	**Partner #3**
Prof. Paolo Pozzobon CIRT, University of Genoa, Via all'Opera Pia, 11A, I-16145 Genova. Italy. Tel. +39 010 353 2181 Fax. +39 010 353 2700 eMail: pappo@die.unige.it	Dieter Würgler ENOTRAC AG Postgässli 23, CH-3661 Uetendorf. Switzerland Tel. +41 33 345 6222 Fax. +41 33 345 6225 eMail: dieter.wuerglur@enotrac.com

7. Exploitation and Dissemination of Project Results

7.1. Industrial Applications

7.1.1. ESC InfoBank.

Principally the main application of the ESC InfoBank is as a repository for ESC knowledge and know-how. The benefit of the ESC InfoBank approach is that the contents form a relational database so it is easy for the user to “click” or “surf” from entry to entry going deeper and deeper into the information relevant to his/her enquiry.

Because of its contents the ESC InfoBank can also be used for educational purposes to increase employees’ awareness of the topic of ESC and help increase their knowledge and abilities on this topic.

The remaining application of the ESC InfoBank is as an information dissemination tool. The database can be used to store the results of future ESC projects and working groups. A great example of this will be the future dissemination of the results from the Fifth Framework Programme project, EMC-ARTS.

7.1.2. ESC UserGroup

The network of the ESC UserGroup can be used by members as a support network in addition to just the contents of the ESC InfoBank. The ESC UserGroup includes members from almost every European country and all of the major industry manufacturers. Through this network it is possible for members to contact experts in different fields to locate ESC information and advice.

The ESC UserGroup is also a good network from which to gain feedback and opinion of ESC issues such as legislation and standards. Presently there is a lot of ongoing work in the fields of EU directives, trans-European networks and ESC related standards. The ESC UserGroup provides a great method of obtaining inputs and feedback for these instruments.

7.1.3. Technological Benefits

- Development and design of new rolling stock
- Development and design of new signalling and control equipment
- Development and design of new power supply systems
- Assessment and demonstration of compliance for rolling stock
- Assessment and demonstration of compliance for signalling and control systems
- Assessment and demonstration of compliance for new power supply systems
- Development of new ESC methods, tools and processes

7.1.4. Commercial Benefits

- Savings in the amount of time required to collect ESC requirements
- Savings in costs through more robust ESC design of components and systems
- Savings in costs through more effective ESC demonstrations of compliance
- Reduction of required ESC resources
- Promotion of ESC technologies and skills through entries in the ESC InfoBank.

7.2. Risks

The major risks to the continued success of the ESC InfoBank and ESC UserGroup are accuracy of information, stagnation of contents and losing it's critical mass of users and support.

Information accuracy is one of the biggest criticisms of the ESC InfoBank concept. It is virtually impossible to guarantee that the data and contents reflect the latest state of the art or that they have not been entered incorrectly. The mechanism to avoid this was to ask users as an information fee payment to review and update entries which were out of date or erroneous.

Now that the project has drawn to a close there is a great risk that the contents of the database will be left to stagnate. In other words no new entries or information updates will be incorporated in the future. To avoid this stagnation, it is intended that the ESC InfoBank will become a future dissemination tool for other ESC projects and working groups such that there will be further growth of the database contents. Coupled to this is the intention to also continue with the charging of an information fee for users in return for ESC InfoBank access.

The final risk is that the ESC InfoBank will simply dwindle through lack of support. This is the greatest risk to the future. The only way to keep ESC InfoBank usage alive and maintain the ESC UserGroup is through promotion and advertising. As the existing project partnership will break up now that the project is complete another agency or champion needs to take over to keep on actively supporting these two instruments. The natural successor for this task could be a European railway player such as UIC, AEIF, UNIFE or possibly the future European Rail Agency. This risk has yet to be addressed and remains open despite the great efforts of the project to locate a patron for these instruments.

7.3. Market analysis

The need for an ESC UserGroup and ESC InfoBank remain. Complete European Interoperability, on either high speed or conventional routes, is still a long way off. Until such time, ESC engineers are faced with the issue of trying to live with today's complex mixture of equipment and ESC regulations.

One clear observation during the duration of this project is that the emphasis and expertise related to ESC issues is moving away from infrastructure owners and train operators to the railway equipment manufacturers. Many infrastructure owners have poor asset registers and no longer understand the limitations or requirements of their systems. To overcome this they place unrealistic demand upon their suppliers in order to transfer liability and many requirements err heavily on the side of safety in order to reduce perceived risk to as little as possible. This makes life extremely difficult for the manufacturers and suppliers of railway equipment whilst at the same time indirectly increasing the cost of equipment that the railway owners and operators wish to purchase.

Regulation of railway ESC is also developing and facing significant ESC problems. Firstly the creation of TSIs has lead to the attempt to define ESC requirements for large sections of Europe's railway system. Due to the density of systems and equipment types this has become something of a European quest for the Holy Grail. A quick look in the ESC InfoBank will give an idea of the number of different systems and hence challenge facing the industry. This situation will only improve slowly as infrastructure owners' move towards harmonisation of systems and requirements thus allowing suppliers to develop solutions for a larger market place and with the costs benefits of increased sales volumes and longer production runs. Until such a time a designer's best friend is a comprehensive asset register such as the ESC InfoBank where information is easily found and retrieved.

The last market trend observed is the increasing complexity of railways with ever new technologies and applications being deployed. Of particular interest in the field of electrical systems are the developments in wireless technologies which utilise the electromagnetic spectrum. Large scale advancements are being planned such as ERTMS / Eurobalise, smart ticketing, Bluetooth

applications, remote diagnostics and monitoring and GSM-R all of which hope to survive in the polluted electromagnetic railway environment. It is vital if these systems are to be deployed successfully that their designers have access to the existing requirements of Europe's railway systems. Vice-versa is the need to dissemination the ESC properties and limitation of these systems to other equipment manufacturers, owners and operators so that they can consider the implication for their own products and services.

Further developments in railway powers supplies will also lead to big ESC challenges. The spread of 25kV 50Hz routes into new member states and alongside existing DC infrastructure will require careful management. As will new technologies designed to increase railway efficiencies such as fly wheels and super capacitors for energy storage, the spread of the practice of regenerative braking and the continued replacement of old traction systems with new higher frequency switching systems. A classic example of the consequences of non-compatibility is the need now in Southern England to completely upgrade the entire 750V DC network supply following the introduction of new IGBT driven rolling stock.

In all areas where ESC problems have arisen, the overriding issue has been lack of communication and availability of system ESC requirements. A common asset register and network of contacts such as the ESC InfoBank and ESC UserGroup can meet this demand and fill the transition period from today's complex, state driven, railway network to the future interoperable, open market, railway structure envisioned by the European Commission. Until such time there will always be a demand for the instruments of this project.

7.4. Intellectual Property Rights

The ESC UserGroup and any related publications or symbols are property of the European Commission and the project partners.

7.4.1. Ownership of the ESC InfoBank Tool

The design of the ESC InfoBank tool is the property of Bombardier Transportation and will remain so after the conclusion of the project. However, Bombardier Transportation grants the custodian(s) of the ESC InfoBank and it's contents, licence to employ the tool for this purpose for a long as the concept of an ESC InfoBank with supporting users exists.

7.4.2. Ownership of the Contents of the ESC InfoBank

The contents of the ESC InfoBank are the intellectual property of the ESC UserGroup and those who provided the information in the first place. At the end of the existing project the contents will be passed over to the organisation that is tasked with continuing to run the ESC InfoBank. This organisation is ENOTRAC AG and so they will become custodians of this information.

The contents of the ESC InfoBank are not considered part of the tool and as such it would be permissible to transfer them to another suitable permanent home or tool if deemed necessary.

7.5. Further Marketing, Communication and Networking

Following the closure of the present ESC UserGroup project an interim business plan has been established where by ENOTRAC will continue to operate the ESC InfoBank and member access will be guaranteed for the next 2 years. During this time ENOTRAC will market a service where by customers can contact them for information and ENOTRAC will use the ESC InfoBank contents and ESC UserGroup network in order to try and find the relevant information.

It is also hoped that any future European Union funded projects into railway EMC or ESC will employ the ESC InfoBank there dissemination tool. This is already planned for the ongoing EMC-ARTS project and any other railway EMC projects launched under the 6th Framework Programme.

8. Conclusions and Assessment

8.1. Conclusions of the ESC UserGroup Project

Perhaps it may be worth while to begin with the conclusion of the ESCARV project which lead to the creation of the ESC UserGroup project, “One large barrier towards European railway interoperability still remains - the allocation of clear boundaries between the supplier, train operators, infrastructure managers, consultants and authorities. The railway business must run on market terms, but there must be clear political instructions to each player describing their role and responsibility. The responsibility for characterising infrastructures and setting up requirements is not the job of the supplier nor the train operator. Equally, it is not the job for the operator to design a new train or signalling system. Once these issues have been clarified we may start to see an attractive and profitable business for all involved parties”.

With this problem so clearly identified the ESC UserGroup has attempted to help the railway industry clarify ESC interfaces, requirements and responsibilities between infrastructure owners, operators and suppliers. Unfortunately despite all the effort and goodwill shown it is fair to summarise that generally the conclusion from ESCARV still holds true today.

The attempts of the project to create a business plan for permanent operation of the tool illustrate the overall problems within the industry at present. Even with the participation of the AEIF and strong support from the European Commission it was impossible to communicate and generate significant awareness of the ESC issues such that a strategic leader would step forward and claim ownership of the work. This illustrates the lack of strategic vision, technical understanding and cooperation which currently hamper this industry at the higher levels.

The lack of technical skills displayed by the infrastructure owners is a worrying trend. The problem is that without a technical knowledge of their assets, the infrastructure owners can not provide clear specifications to their network operators. The operators in turn cannot provide clear specifications to the manufacturers and this has a knock on effect to their sub suppliers. All this lack of detail significantly increases the design, production and commissioning costs of railway equipment due to unforeseen problems, re-design work and delayed entry to service.

The area where this is felt most strongly is with the large rolling stock manufacturers who have been strongly involved in the ESC UserGroup projects. Within the infrastructure owners and operators there appear to be an awareness of these issues as there have been representatives of these organisations at both ESC UserGroup workshops keen to learn more about the subject. This interest does not seem to have gone beyond a technical curiosity as at a management level no resources are available within these organisations to assist this project either on the steering board or with the supply of information through the information collection sub contracts.

Despite all the above set backs and difficulties some positive conclusions can also been drawn from this project. A significant amount of work has been performed in the 30 month duration of the project and it’s legacy will be firstly the database of information, which now numbers more than 2,000 entries, and secondly and perhaps more importantly, a network of contacts and relationships which will benefit any strategic ESC initiatives of this industry. For example, any new EU funded ESC projects or related activities can be disseminated through the ESC InfoBank and immediately reach over 100 key players. Likewise the network can also be used to gauge feedback and suggestions to new strategies and innovations regarding ESC.

8.2. Technical Assessment

During the entire 30 months of the project no technical problems have become apparent with either the ESC UserGroup websites or ESC InfoBank tool itself. Updates of the ESC InfoBank contents and user interface have been performed and are operating as expected.

New ESC UserGroup members have been allocated user names and passwords and given access accordingly to the ESC InfoBank with access rights as “UserGroup Candidates”

The contents of the database have been grown from an initial number of 1531 entries to 2210 with more expected to trickle in after the project closure as the last submissions for the sub-contractors are received. This represents a growth in size of 44%.

The number of ESC UserGroup members has also grown over the project from 63 to 150, an increase of over 100%.

The usage of the ESC InfoBank has also increased for the duration of the ESC UserGroup project. Before the start of the project, with 63 members, the “hit” rate was approximately 360 per month. During the project, the “hit” rate, with an increasing membership, was approximately 425 per month.

The concept of the “information fee” for members’ participation is successful, despite the difficulties of the experts to find the necessary time for their contributions. There is no doubt that being able to participate in the ESC UserGroup with out resorting to financial commitments has been a big incentive in gaining industry and member support. The “information fee” has also proven to be extremely flexible and able to accommodate large multinational corporations as well as small research institutions or consultancies within the ESC UserGroup

The one detraction of the “information fee” is that it requires individual agreement with each member as to the content the information they shall supply or review. Whilst this lead to significant administration in collection of the “information fee” the amount of effort required is still lower than that required in the collection of a financial fee from each individual member.

The criticism which has most often been raised against the ESC InfoBank is that there is no guarantee of the accuracy of the information contents and the obvious consequence for designers of acting of erroneous information. The answer to this may be that individual infrastructure owners, operators and suppliers have to build their own ESC databases. This way the contents of the databases are their responsibility and they can stand firm behind the accuracy of these contents and ensure that the latest revisions and amendments are included. This may already be on the way as the Dutch and Swiss railways, NS and SBB, and beginning to make their network access requirements available to suppliers through the internet.

8.3. Financial Assessment

Looking at the final cost statement it can be seen that the ESC UserGroup project has been completed almost exactly according to budget. A small under spend on the total amount of 1100 Euros has been achieved.

This overall view disguises several points however.

- All partners except AEIF have significantly over spent on their travel budgets.
- AEIF has under spent significantly on their original budget for personnel costs whilst the other partners have over spent
- The budget for subcontractors was under spent by almost 45,000 Euros due to difficulties in placing contracts of the supply of information
- ENOTRAC has incurred costs over budget for both personnel and computing costs.

The areas of overspend in the project are hidden in the final cost by the significant under spends in Bombardier subcontracting costs and AEIF personnel costs. Some budgetary transfers in the final cost statement, Ref #1, have been made to reflect the differences between actual costs incurred and the original budgeted costs in the project proposal forms, Ref #3.

9. Acknowledgements

Our first acknowledgement must go to the project sponsors, the **European Commission** and the **Swiss, Federal Office for Education and Science** (BBW). The partners would particularly like to acknowledge the strong support and inputs provided to the project by the project's scientific officer, **Joost de Bock**. His efforts have been greatly appreciated by all.

The other group of people to whom the project owes a great deal of thanks are to all the **information sub-contractors** who have worked so hard to collect information for the work packages. This has been an exceedingly tedious task and we greatly appreciate the efforts they have put in to motivate, communicate, decipher and information owners and national operators. These include the following organisations,

- AEA Technology UK Limited
- Bombardier Transportation Switzerland AG
- Holland Railconsult
- Omegati S.r.l
- Rete Ferroviaria Italiana, RFI
- BAV
- University of Warsaw

Finally the people who really made this project go anywhere are the **ESC UserGroup members**. For those of you who have joined and participated through submission of information fees, participation at the workshops, or who have just logged on to use the database we say "Thank you very much!". Without you no of this would have been worth while or made any difference.

In addition to those already mentioned above I would personally like to thank the **project partners, AEIF, Bombardier, Enotrac AG and the University of Genova,** and **steering committee (SteCo), Siemens, Alstom, SNCF and DB.** It has been a pleasure to work alongside them and to share in their ideas and enthusiasm has been a privilege. At times this project has beenboth frustrating and exhilarating but the residing memory for me personally will be the team spirit and character of the numerous people that I have met. THANK-YOU!

Further special acknowledgements must go out to:-

All the **ESCARV partners** for agreeing to publish the results of their project in the ESC InfoBank.

The **speakers** and **facilitators** who took the time to come to Paris and share their ideas and work to us at the 2 workshop events.

Doris Danzinger (ERRI) for the smooth organisation and professional running of our workshop events in Paris, particularly given the short notice given by the project partners for the preparation of the first event.

10. References

#1. UG1-013 ESC UserGroup Final Cost Statement Table

#2. UG1-014 ESC UserGroup Final Technological Implementation Plan

#3. ESC UserGroup Proposal Forms A,B,C

#4. ES1-034 ESCARV Final Synthesis Report, Anders Jenry Petersen

11. Glossary

Abbreviation	Description
AEIF	Association Européenne pour l'Interopérabilité Ferroviaire – European organisation to draw up the Technical Specifications for Interoperability (TSI).
BAV	Bundesamt für Verkehr, the Swiss Federal Office for Transport
BBW	Bundesamt für Bildung und Wissenschaft, the Swiss, Federal Office for Education and Science.
CIRT	Centro Interuniversitario di Ricerca Traspotri – Group of Italian universities which focus of transportation research. Project partner is University of Genoa
DB	Deutsche Bahn, German National Rail Operator and Owner.
ERRI	European Rail Research Institute
ERTMS	European Rail Traffic management System – New European wide automatic train protection system incorporating Eurobalise.
ESC	Electrical Systems Compatibility – Topic covering the electrical compatibility and immunity of systems which generate radiated or conducted electrical interference.
ESCARV	Electrical Systems Compatibility of Advanced Rail Vehicles – Previous European Commission, Brite-Euram project concerning ESC in railways.
ERRI	European Rail Research Institute
FS	Ferroviaria del Stato. Italian National Rail Operator
NS	Nederlandse Spoorwegen. Dutch National Network Operator
RFI	Rete Ferroviaria Italiana. Italian National Rail Network Owner.
SBB	Schweizer Bundesbahn. Swiss National Operator and Owner
SNCF	Societe National Chemin de Ferr. French National Operator
TSI	Technical Specification for Interoperability – means the specifications by which each subsystem is covered in order to meet the essential requirements as defined in the Directives and to ensure the interoperability of the Trans-European high-speed and conventional rail system.

12. Annexes

12.1. Manpower Table

See Reference #1. UG1-007 Project Cost Statement Table, Sheet E2 “Table 3” for manpower details.

12.2. Manpower/Project Plan

See Section 5. Comparison of Planned Activities Against Work Actually Performed

12.3. Budget Follow Up Table

See Reference #1. UG1-007 Project Cost Statement Table, Sheet E2 “Table 3” for budget details.