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Abstract: This deliverable is the final result of the work carried out by the FRAME-NET Thematic Network from July 2001 to September 2004. It gives an overview of the main findings of all deliverables, as well as recommendations to the European Commission with respect to future support and enhancement of the European ITS Framework Architecture.

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Executive Summary

ITS Architecture can be a very powerful tool for authorities or other system owners across Europe to plan their ITS in a way which is cost-effective and future-proof. Also will it create direct benefits for the citizens of Europe, because its application can provide services which are continuous and systems which are interoperable across boundaries and of lower cost, because of synergy and economies of scale.

Since the huge benefits, predicted for ITS in the early 90-ies, were not realised because of slow implementation as well as lack of synergy, the High Level Group on Telematics developed a short term action plan, which was supported by a resolution of the European Council in '97. A European ITS Architecture was one of the handful of actions called for and the European ITS Framework Architecture was developed in the 4th FP project KAREN, from 1997 – 2000.

Because of the European realities of subsidiarity, diversity of policies, environment and circumstances and the continuous evolution of technology, a specific strategy was required. The strategy for maximum effect of KAREN has been to develop, at the European level, a technology-independent, high-level framework architecture, from which compliant national and regional architectures, as well as lower level system architectures could be derived. The existence of a European Framework architecture on the one hand gives derived national and other architectures a head start because they can be developed in considerable shorter time and lower cost and provides on the other hand coherence between national and other architectures.

For this strategy to be successful the creation of a strong and very involved user community was essential. A user community who would develop, based on their actual needs, their own national, regional or other architectures compliant with the European Framework Architecture.

The FRAME projects, FRAME-S and FRAME-NET, have seen to the **deployment** of the European Framework Architecture, developed under KAREN. And it is fair to state that they have been very successful at that. Users statements illustrate that:

“using FRAME has saved us considerable time and cost in developing our own national architecture”;

“we would not have had a national architecture for large scale deployment of our ITS, if it were not for FRAME”;

“developing our FRAME-based national architecture has cut time for deployment of road-safety systems in half, saving dozens of lives”.

The FRAME projects have created an active user community for ITS architecture across Europe.

They have created awareness of the usefulness of ITS architecture, which has led to decisions, at the highest levels and in a growing number of member states, to develop derived, national architectures, compliant with the European Framework Architecture. They have provided training and support to those developments, cutting down their development time and costs.

They have organised feed-back from national architectures and requirements for the maintenance and evolution of the European Framework Architecture.

They have provided this maintenance and evolution.

They have, together with their active users, looked into impact assessment and evaluation of ITS architecture.

They have interacted with a lot of European projects and platforms to address issues of architecture, organisation and ITS strategies.

While FRAME-S looked after the operational tasks of architecture maintenance, education and training of users, development of architecture navigation tools and direct, bi-lateral user support, FRAME-NET has acted as the interface between users, European projects and platforms and FRAME-S, promoter of the architecture idea to the European Community and as the Forum where users participated in common activities and exchange and gave guidance for FRAME-S.

In order to do this, FRAME-NET undertook diverse action. They set up a dedicated website and also organised systematic dissemination of information regarding the Architecture through brochures, Newsletters, email and other channels. It has also provided numerous opportunities for contact and consultation. Through the activities of FRAME-NET, all those involved in ITS architecture-related activities have been able to meet for discussions, exploit their accumulated experience and, in this process, provide useful feedback to the FRAME projects. These activities involved the growing number of countries (among the EU-15 Member States and also the new Accession countries), which have already developed ITS Architectures or are interested in doing so.

FRAME-NET organised a large number of events over the three years, including four ITS Architecture Clustering meetings, three Global Workshops, and gave numerous presentations in seminars and ITS events. These gave the opportunity for discussions on key issues and presentations of input collected from ITS Architecture users. A systematic procedure was adopted for the formulation and validation of new proposals, requests and modifications to the Framework Architecture. These requests were forwarded to the FRAME-S project team and, where appropriate, resulted in the updating and extension of the European ITS Framework Architecture (three new versions were issued during the project). The close co-operation with the 'twin' project FRAME-S has been an important aspect of the FRAME-NET activities.

FRAME-NET set up four Work Groups to investigate technical issues relating to the Framework Architecture and to produce recommendations for improvements in the Architecture itself and the support activities, including the Navigation Tools, which were developed to facilitate its use. These groups consisted of representatives of the main European countries involved in architecture activities as well as the FRAME-NET partners. Reports were produced on: the extension of the Framework Architecture to intermodality, an impact assessment and cost/benefit analysis, a validation of the Framework Architecture by national initiatives, recommendations regarding the Browsing Tool and Selection Tool, and an assessment of the effectiveness of the consultation (Clustering) process.

To ensure coherence, the Network has also established contacts with a number of other European platforms and networks (e.g. WATERMAN for waterborne traffic, THEMIS for Freight & Fleet Management) and well as the six Euro-regional projects

and the national projects co-funded by the European Union through the TEN-T programme for ITS (2001-2006) managed by DGTREN.

To enhance the case for deployment of ITS in Europe, FRAME-NET participated in strategic platforms and discussions, such as about the future ITS strategy of DG-INFISO with ROSETTA, needs and approaches for education and training of ITS in Europe with ROSETTA and ECTRI, the MANDATE 270 with CEN/ETSI/CENELEC.

To raise awareness of ITS architecture and promote the case for having one, both European and national events were attended as well as bi-lateral contacts established. The FRAME-S seminars and workshops were also promoted at these occasions.

1 Introduction

1.1 Background

The European ITS Framework Architecture was developed by the European Commission funded KAREN project and was first released at the end of that project in October 2000. It was developed in response to the need for a single reference platform in Europe, which would provide a basis for the development of ITS products and services. A number of national authorities have since started to develop their own national ITS framework architectures, and are adapting KAREN to their own needs. In this context, the FRAME-NET Thematic Network was developed to co-ordinate and encourage the implementation and enhancement of the European ITS Framework Architecture and to give guidance to users and co-ordinate on-going activities involving the Framework Architecture.

1.2 Project objectives

The prime objectives of FRAME-NET Thematic Network included:

- To co-ordinate and promote the wide-scale implementation of ITS in Europe through the deployment of the European ITS Framework Architecture
- To provide a focal point for confrontation and co-ordination of ITS architecture-related activities in the whole of Europe.
- To provide a user forum for the guidance and validation of what was developed in FRAME-S, and overall co-ordination to ensure implementation coherence at the European level.
- To maintain the momentum previously developed by the KAREN project and encourage wider use of the Framework Architecture
- To facilitate interaction and knowledge exchange between actors involved in ITS architecture-related activities by providing a forum for dissemination and concertation.

2 Project Details

2.1 Project Duration

After submission of a proposal, and negotiations with the European Commission, the Project was set up with a start date of 1 July 2001 and a completion date of 31 March 2004. The Commission agreed that the support the project provided to its users through Europe should continue as long as possible and the completion date was subsequently extended to 30 September 2004, following acceptance by the EC of a contract amendment submitted by the Partners. This gave a total duration of 39 months for the Project.

2.2 Project Participants

The FRAME-NET project included the following three contractual partners:

Dutch Ministry of Transport, Rijkswaterstaat -AVV Transport Research Centre, RWS-AVV, (Project Coordinator)

Mizar Automazione S.p.A.

ERTICO

In addition, seven organisations have contributed to carry out various specific tasks during the project with the status of Members to the project:

Swedish Road Administration (SRA)

The Netherlands Organisation for Applied Scientific Research (TNO)

UK Department for Transport (DfT)

Traficon Ltd (TCON) on behalf of the Finnish ministry MTT

Netherlands Economic Institute (ECORYS/NEI)

Direction de la Sécurité et Circulation Routières (DSCR) of France

Italian Ministry of Transport and Infrastructure(MIT)

Two of the above organisations (Mizar and ERTICO) were also partners in the FRAME-S Project.

2.3 Project Structure

The FRAME-NET project was organised in four WP's as can be seen in Figure 1. WP1, Project Management, maintained close liaisons with partners and members to ensure the execution of the project's workplan. A fundamental feature of WP2, Network Management, was to ensure the exchange of information with the user communities, regular liaison with related organisations and projects, and a procedure for producing updates and modifications to the Framework Architecture, which was achieved through organising Clustering Meetings and International Workshops. WP3 involved the project members in executing architecture support activities based on the user requirements and feedback. They included an investigation in the needs and priorities for intermodal extension of the architecture, a validation based on the

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implementation of national architectures, an assessment of the impact of ITS architectures and a validation of the navigation tools developed by FRAME-S. WP4 provided promotion and dissemination of the framework architecture through various mechanisms.

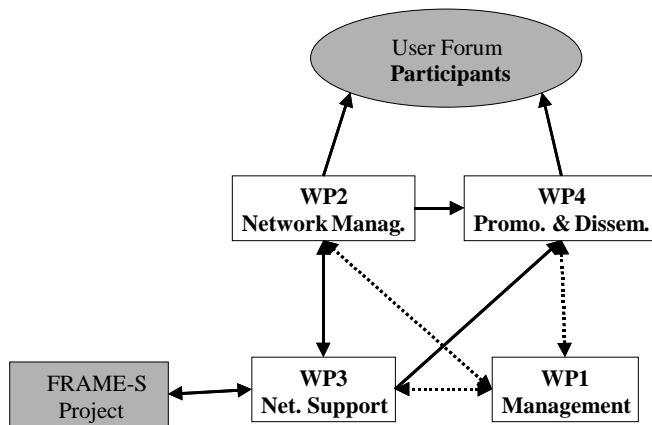


Figure 1 Project structure

2.4 Relationship of the FRAME-NET and FRAME-S projects

When the proposals were being written for both the FRAME-S and FRAME-NET Projects, it was realised that a formal structure needed to be defined for the relationship between them. This structure is shown in Figure 2, and was used to illustrate the relationships between the two projects, rather than impose a formal process by which they maintained contact and exchanged information. It was however always expected that much of the “day-to-day” exchange of information would be on an informal basis, which also proved to be the case throughout the activities of both projects.

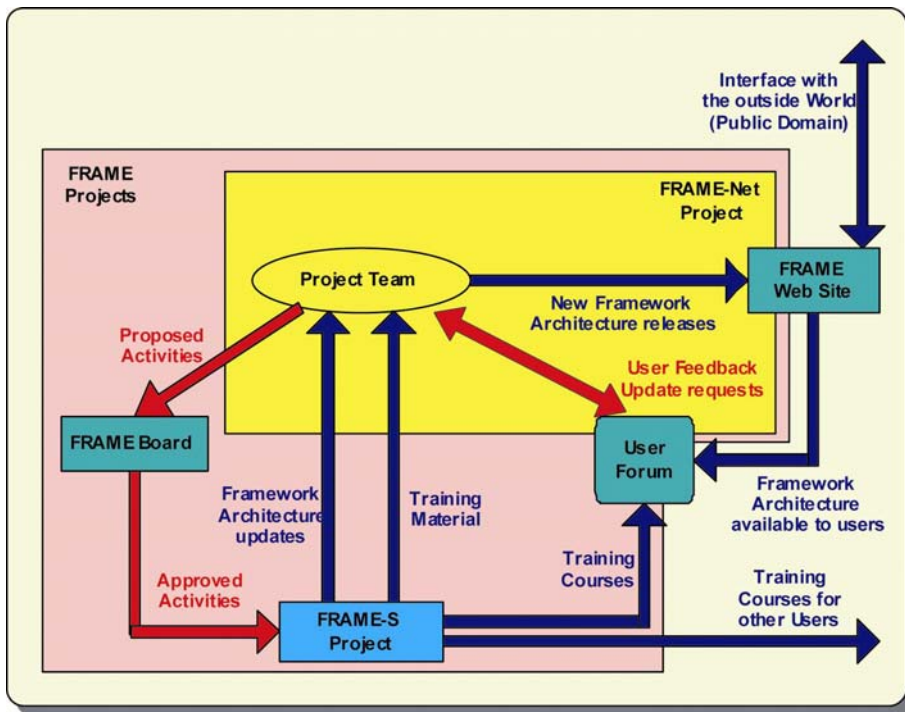


Figure 2 Relationship between FRAME projects and external actors

2.5 Project Deliverables

The list of deliverable documents for the FRAME-NET Project agreed as part of the contract negotiations with the EC is shown in Table 1 below.

No.	FRAME-NET Project Deliverable	Due Date
D1.1	Project Quality Plan	September 2001
D1.2	Final Report	November 2004
D2.1	Participant Database	October 2001
D3.1	Intermodality WG Report	March 2002
D3.2	National Validation WG report	October 2003
D3.3	Navigation Tool validation WG report	November 2004
D3.4	Impact assessment WG report	June 2003
D3.5	Clustering Report	September 2004
D4.1	Frame Website	September 2001
D4.2	Project Presentation	September 2001
D4.3	Dissemination plan	January 2002
D4.4	Frame brochures	April 2002 and February 2003
D4.5	Frame CD-ROM	November 2004
D4.6	Collate of products articles and dissemination material	November 2004

Table 1 Overview FRAME-NET deliverables

WEB SITE

www.frame-online.net

INFO

info@frame-online.net

3 Network Management

This workpackage involved the practical management of the Network's activities to ensure the co-ordination with co-operating projects. A fundamental feature of the network management was the systematic process adopted to ensure the exchange of information, regular liaison with related organisations and projects, and a procedure for producing updates and modifications to the Framework Architecture. This was achieved through the organisation a series of Clustering Meetings and International Workshops.

3.1 Cluster meetings

Four Cluster Meetings were held during the project, in Brussels and in Vienna:

25 October 2001, Brussels
23 April 2002, Brussels
21 November 2003, Vienna
23 September 2004, Vienna

After the first meeting, which had low attendance, it was decided to hold them in conjunction with other events where possible. Consequently, the 2002 meeting was held jointly with a THEMIS network seminar, the 2003 meeting with ITS Austria, and the 2004 meeting immediately after the i2TERN Congress. The choice of Vienna was also influenced by the desire to facilitate participation of representatives from the EU Accession countries in Central and Eastern Europe.

Before these meetings, the FRAME Board consulted about the agenda and in general also met in order to decide the main themes to be presented for discussion. After the meetings a report was written to summarise the main issues raised. Where these required action, the implications were examined by the FRAME-S project partners who consulted when necessary with FRAME-NET.

These meetings served primarily as an opportunity to:

- exchange news on the state-of-the-art of ITS architecture work in Europe
- present documents/reports recently issued by the FRAME projects
- present the changes made in new issues of the Framework Architecture and tools
- make suggestions/proposals for activities, improvements, and extensions.

The issues discussed tended, in general, to be of a general nature rather than detailed technical matters. It was also noticeable that while early Cluster Meetings consisted mainly of presentations by FRAME project members of the activities being carried out, the later meetings produced far more requests and proposals from the users.

Meeting reports were produced from each Cluster Meeting, which have been published on the FRAME website, see Table 2below.

Activity	Type of issue raised	Location: Report	File location / name
Cluster Meeting 1 25.10.01	Information on FRAME Projects, Work Groups, Training Workshops	Minutes	Website: MEETING REPORTS CM1Minutes25Oct01
Cluster Meeting 2 23.03.02	Questions concerning Intermodality	Minutes	Website: MEETING REPORTS Cluster23-04-02 Report
Cluster Meeting 3 11.03.03	Various	Report Newsletter	Website: LIBRARY/Newsletters November 2003
Cluster Meeting 4 23.09.04	Requests for support Proposals for future	Minutes	Website: MEETING REPORTS (not yet issued)

Table 2 Cluster meeting overview

3.2 International workshops

In the first year of the projects, advantage was taken of the 8th World ITS Congress in Sydney to organise a workshop in, which architecture issues of worldwide significance would be discussed. In addition to European representatives, there were presentations from the United States, Australia, and Japan. Due to the success of this workshop, it was decided that FRAME would hold a Global Architecture workshop every year at the World Congress. These were as follows:

5th October, 2001, 1st Global Workshop, Sydney (at 8th World ITS Congress)
 15 October, 2002, 2nd Global Workshop, Chicago (9th World ITS Congress)
 19 November, 2003, 3rd Global Workshop, Madrid (10th World ITS Congress)

The main issues raised at global level concerned:

- Deployment - how can State/Regional/City Authorities be persuaded to develop and deploy ITS Architectures?
- Global standardisation - in what areas should global Architecture standardisation be sought?
- Data Registry - would it be feasible to create a Global Data Registry or is it more realistic to have a series of National Data Registries?
- Interoperability - how should ITS Architecture projects promote this?

Detail of the discussion of these issues can be found in the relevant reports on the FRAME website, see Table 3.

Activity	Type of issue raised	Location: Report	File location / name
1 st Global Workshop	Global Data repository Global standardisation Deployment strategies	Report with presentations	Website: MEETING REPORTS 2001-10-5 Minutes Combined Report

2 nd Global Workshop	Global Data repository Deployment strategies	Report with presentations	Website: MEETING REPORTS 2002-10-15 Working Report.pdf
3 rd Global Workshop	Global Data repository	FRAME Newsletter	Website: MEETING REPORTS December Newsletter
International Workshop Budapest May 2004	Various	FRAME Newsletter	Website: MEETING REPORTS September 2004

Table 3 Overview Cluster meeting reports

4 Network Supporting Activities

An important aspect of the project were the support activities. These were undertaken to provide the opportunity to examine certain key technical issues relating to the Framework Architecture and to make it possible to pass on recommendations of a technical nature to the FRAME-S Project, which would then make the necessary enhancements to the Architecture.

Four Working Groups were set up for this purpose. Members included representatives of the major national architecture initiatives in Europe of the time: France (DSCR), Italy (MIT), UK (DfT), Finland (Traficon), the Netherlands (TNO), and Sweden (SNRA) in addition to the FRAME-NET partners. These groups held a number of workshops and presented their conclusions in the following set of reports:

4.1 Intermodality (Report D3.1)

The original brief of the European ITS Framework Architecture was to focus on road-based ITS applications. However, given the emphasis on intermodal transport in the European Common Transport Policy, Work Group 3.5 had the task of analysing a possible future extension towards intermodality. The group therefore reviewed the progress made in the area of inter-/multi-modality in national ITS architectures in Europe, and also investigated the situation with regard to other modes.

It was concluded that while the creation of a fully 'intermodal' European architecture is not a feasible objective, there does exist a real need for the inclusion of intermodal interfaces, especially in key areas. A number of Member States have already made significant progress with respect to inter-/multi-modality in their national architectures and are making strong demands for coverage at European level in order to avoid isolated national solutions. The Thematic Networks concerned with other modes, such as WATERMAN and THEMIS, have expressed this same need.

It is therefore considered important that the impetus already gained from the ITS architecture work carried out so far in intermodality should be carried forward with as little delay as possible. In this respect, it was agreed that there are the two main requirements:

- the institution of a *Consultative Body*, which would provide a high level guidance and strategy for ITS Architectures across all modes;
- the setting up of a number of *Expert Teams* who would work on the development of the appropriate extensions to the European ITS Framework Architecture.

The Expert Teams would act as Task Forces responsible for developing extensions or adapting existing national architectures. It was suggested that Italy, France, Austria, and Norway should be among the countries initially involved. They would have the task of developing multimodal ITS architectures in specific key areas.

The activities of the Group have been important in already establishing contacts between these players. In addition, it has already been possible to identify a number of priority areas, among them:

Passenger transport:

- i) descriptions of interfaces permitting data exchange between *information systems* for the different modes;
- ii) an *organisational architecture* for the management of intermodal transport to permit progress towards 'seamless' transport systems;
- iii) development of ITS architectures for *multimodal payment systems*, i.e. both technical and organisational aspects concerning the use of smart cards.

Freight transport:

- i) better *integration* of Traffic Management data and Fleet & Freight Management Systems to facilitate intermodal transfers of freight;
- ii) Information and Organisational Architectures for *intermodal hubs* (various combinations of road/rail/water/air);
- iii) *tracking and tracing* of loads or containers throughout intermodal trips;
- iv) the tracking of dangerous freight through different modes.

4.2 National Architectures Validation (Report D3.2)

The objective of the Validation Study was to make an assessment of the 'usability' and 'usefulness' of the European ITS Framework Architecture from the point of view of the national ITS architecture initiatives. The aim was to identify the most valuable features of the Architecture, as well as any weaknesses or gaps. The validation exercise took into consideration not only the Architecture, but also the documentation and tools, as well as the various forms of support (seminars, training workshops and technical assistance) provided by the FRAME projects. Information was gathered from a total of 13 European countries.

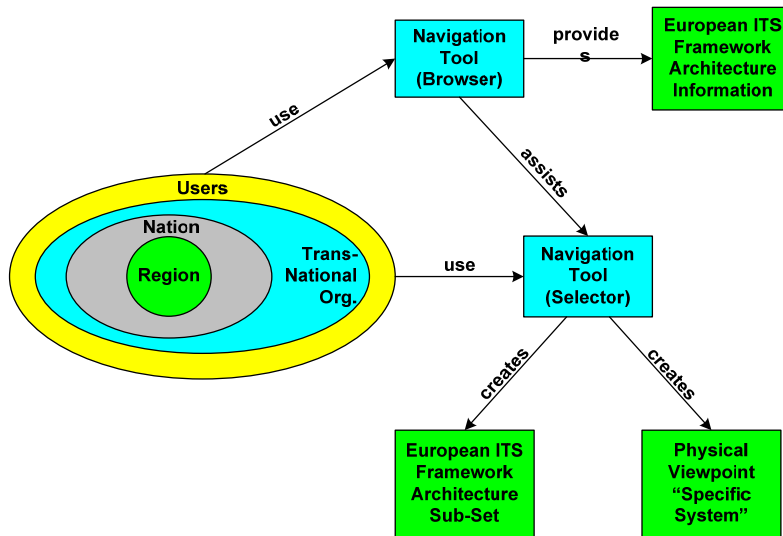
Regarding the Architecture itself, it was concluded that the majority of the early 'teething problems' have now been ironed out. The issues currently emerging have more to do with variations in the *way* it is used than the content. An important and delicate role in the future will be to guide national architecture developments so that they respect the balance between the demands of compliance and the need for adaptability to local requirements and preferences.

Among the support measures most appreciated have been the training workshops, international meetings, and the FRAME website. One of the areas identified for improvement is the technical documentation which it was felt in some cases should be easier to locate and understand. All users emphasised the usefulness of the material and activities which can help to raise awareness of the need for ITS Architecture and to dissipate misunderstandings. The findings of this Report have been crucial in pinpointing the major priorities and concerns of ITS Architecture users..

4.3 Navigation Tool Validation (Report D3.3)

Work Group 3.4 was responsible for validating the FRAME Browsing Tool and Selection Tool, and to give feedback and recommendations to the FRAME-S Project, which was developing the tools.

The purpose of the Browsing Tool is to give access to an HTML version of the Architecture and allow navigation via an Internet browser. The Selection Tool is a more complex instrument, whose function is to support users in the creation of their own architectures. These functions are illustrated in Fig. 1.



The Work Group firstly gave recommendations on the basic principles of the design, then carried out a series of practical tests on demonstration versions of the Tools.

In the case of the Selection Tool, before the technical development phase could begin, the Work Group made a Business Case analysis of the three basic options. This provided a sound basis for a critical decision which had to be made regarding the Tool design. The final choice was for a free-standing Selection Tool.

The Work Group concluded that the process of consultation had led to the adoption of a reliable and robust methodology for the development of the FRAME Browsing and Selection Tools; that the majority of the expectations of users in relation to the scope and style of the Tools had been satisfied; and that a more user-friendly Browsing Tool had been produced as a result of the testing of the “demo” version. Since both tools are fundamental to the practical use of the Architecture, this was extremely important.

A further conclusion is that the active participation of the user community in this Work Group has not only improved the usability of the two Tools, but also promoted a much greater sense of “ownership”.

4.4 ITS Architecture Impact Assessment (Report 3.4)

The task of Working Group 3.6 was to identify, and where possible quantify, the implications of adopting the European ITS Framework Architecture. For decision-makers at national, regional or corporate level who are thinking of deriving their own ITS architectures from the Framework Architecture, an insight into the possible costs and benefits of doing so is essential.

Benefits reported by the National Architectures based on the Framework Architecture included the significant reduction in development time and lower costs. In addition, the possibility of co-operation with other FRAME-compliant architectures and interoperability were considered important advantages.

Among the concerns mentioned by the key users were issues such as the guarantee of continued maintenance of the Framework Architecture in the future, and the continued compatibility between national architectures and the Framework Architecture when new versions were issued. While the former will depend upon whether a follow-on project (or other initiative is launched), the latter was resolved by the production of guidelines on Configuration Management by the FRAME-S Project (Report D14).

By the last year of the FRAME projects (2004) clear and quantifiable evidence of benefits was beginning to emerge especially from early adopters such as ACTIF. By this time, the number of users had also grown and in itself provided a further incentive for further countries to use the Framework Architecture. It was in fact decided in the last Cluster Meeting to begin compiling a 'dynamic' library of best practice cases, which could be added to as examples arose, and consulted by potential users.

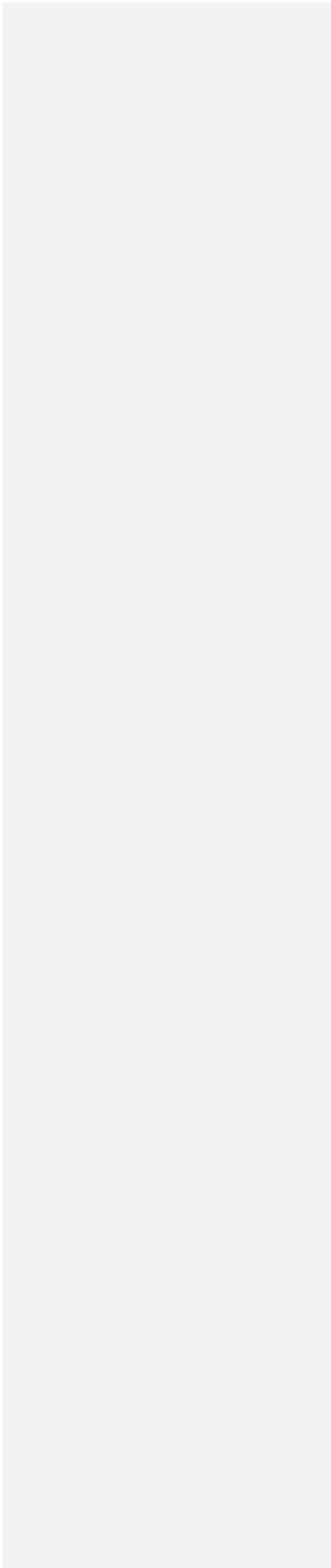
4.5 Cluster Activities (Report D3.5)

The purpose of the 'Clustering' process was to create an active network consisting of current and potential users of the Framework Architecture, and to obtain suggestions for improvements to the Architecture and acceptance of new versions.

The feedback from Framework Architecture Users was expected to derive mainly from the annual Cluster Meetings, but in fact collected through a number of channels, including the Working Groups, International Workshops, ad hoc meetings, Questionnaires, and the Problem Report and Update Forms.

FRAME-NET was in fact very successful in promoting involvement; it was noted that the consultation process intensified during the project. Far more countries were involved in the last year of the FRAME Projects than previously. The degree of active involvement also increased. In terms of geographical coverage, representatives of over half of the present 25 European Member States participated.

With regard to the Cluster Meetings, a significant change took place during the course of the projects. While the first meetings served mainly as opportunities for the members of the FRAME Projects to inform the Users about what was happening, in the later meetings, the Users took a more pro-active role, reporting on what *they* had been doing and making requests for support and advice, or for further changes to the Framework Architecture.



5 Dissemination and Promotion

Systematic dissemination and promotion of FRAME results and activities has been provided throughout the project. It has been achieved through the setting up of a Website serving as a point of reference for information regarding ITS architecture activities. Brochures and frequent newsletters have been produced to inform about project related results and activities. Significant participation at public events in the field of Transport Telematics have also been maintained.

5.1 Dissemination material

Two brochures have been produced during the project. The first brochure was prepared announcing the objectives of the FRAME projects. It included an explanation the organisational approach adopted, a list of participants, system of contacts.



Figure 3 FRAME second brochure

The second brochure, see Figure 3 above, was issued in 2003 giving up to date information on FRAME and comprehensive information of related European national architecture projects. The creation of this brochure was a joint effort with contributions from Austria, Finland, France, Italy and The Netherlands on their experiences developing national ITS architectures and demonstrating the importance for FRAME for their organisations and beyond. This brochure has been in a highly important dissemination tool well distributed at different events. and is still relevant after the project has ended.

5.2 Website

The first version of the website was created in August 2001 when the FRAME projects had just been launched. It has continuously been updated and improved during the lifetime of the project.



Figure 4 Snapshot of FRAME website

There has been an emphasis to create a website serving the user community as well as possible, and one example to illustrate this is the latest revision carried out in spring 2004 following the result of a questionnaire to different users.

-

It can be noted that throughout the project the website has been frequently visited and in Table 4 is illustrated the statistics from the latest three months in 2004

2004	No. visitors	No. visits	No. pages seen	No. pages per visit
July	902	1296	15722	15.79
August	820	1166	25629	25.49
September	1022	1415	42304	29.89

Table 4 Website statistics Q3 2004

These figures are representative as the average number of visitors have been around 1000 persons per month for the last years of the project. The distribution of visitors throughout Europe can be seen in pie-chart in Figure 5. FRAME has also got attention outside Europe with frequent visitors from e.g. Australia, Canada, USA, Japan, Thailand, New Zealand, and Israel.

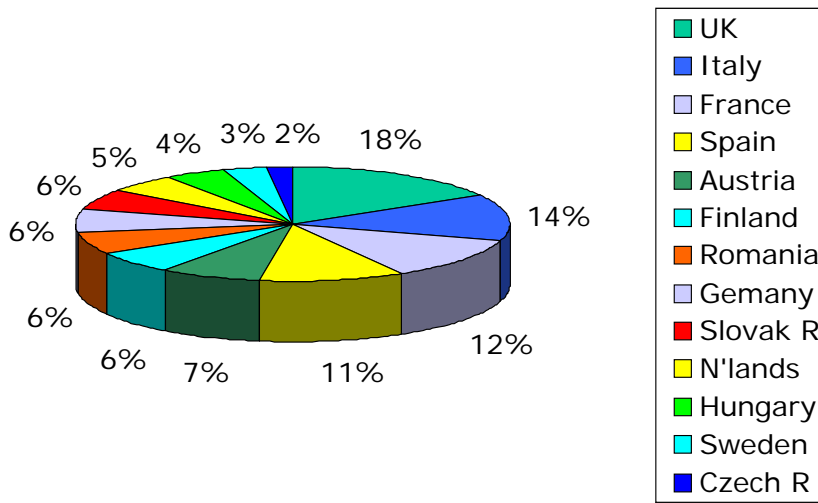


Figure 5 European visitors to FRAME website

A CD-ROM has been produced presenting the latest version of the FRAME website including all relevant documentation of results produced by the FRAME project.

5.3 Newsletters and articles

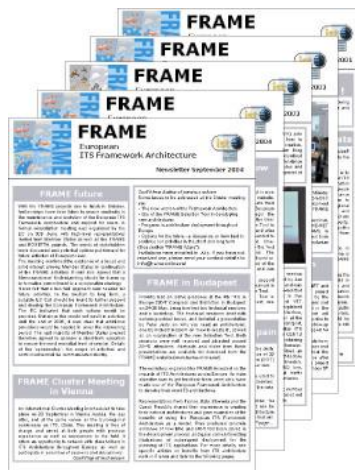


Figure 6 FRAME Newsletters

Five FRAME Newsletters have been issued covering the latest news concerning in the European ITS architecture, covering new issues of the FRAMEWORK architecture material, achievements of national ITS architecture activities, and major findings arising from past meetings. It has been disseminated electronically to our user forum consisting of over 200 major stakeholders from different private and public bodies with a direct interest in ITS Architecture. Articles have also been published in other magazines to promote FRAME to a broader circle. An overview of newsletters and articles is presented in Annex 1.

5.4 Participation public events

Throughout the project FRAME-participants have actively been participating at different public events related to Transport Telematics to communicate the FRAME project activities and results. The major activities included:

- Four Cluster Meetings targeted at our direct user forum including representatives from related organisations and projects. The main objectives of these meetings were to have an effective way to exchange information, and validate updates to the Framework Architecture.
- Four Global workshops at ITS Congresses throughout the project. Targeted to a broader circle to share practical best practice use cases in ITS Architecture developments and to communicate the latest FRAME results.
- Participation at FRAME-S training workshops to disseminate results and extending the network.
- FRAME presentations in ITS Architecture related sessions at different conferences

A complete overview of these different activities is presented in Annex 1.

6 Conclusions and Outlook

6.1 Conclusions

The European ITS Framework Architecture was developed under the 4th FP project KAREN. It was the execution of a recommendation from the High Level Group on Telematics, supported by a resolution of the Transport Council of June 1997, to improve the implementation of ITS in Europe. After the delivery by KAREN of the Framework Architecture (Version 1.0), which covers predominantly road-related ITS applications, a call was made in 2000 to support the **deployment** of KAREN. This call was answered by the two FRAME projects: FRAME-NET a thematic network to organise the users, process their input for evolution and promote uptake of the architecture, and FRAME-S to maintain it, develop user tools, provide education and training as well as direct user support.

In close co-operation with FRAME-S, FRAME-NET has executed its tasks from 2001 till 2004 successfully. It has done so by acting as the generic interface between users and the architecture, organising 'clustering activities' for architecture users and other architecture-related projects, generally promoting the architecture and providing a point of reference for information, as well as setting up workgroups to provide the opportunity for users to provide various technical assessments of the architecture.

During the over three years period, four clustering meetings were held. These events were occasions in which users and other projects were kept informed of progress and activities regarding the Framework Architecture, inputs (feedback) from users were obtained and proposals for its future evolution were discussed. One meeting was organised together with the Thematic Network for Freight, THEMIS. In addition, three global workshops were organised with participants from around the world to exchange experience and discuss common priorities. Liaison was maintained with a host of architecture-related European projects and ITS platforms, and in many cases FRAME representatives participated in their cluster events.

Seminars and workshops of FRAME-S were promoted with potentially interested existing and new users of the architecture. The FRAME-NET co-ordinator participated in some of the FRAME-S seminars to help clarify and promote the use of architecture to decision makers. Applications for associate membership continued to be received during the project; in the last year mainly from CEE countries. All in all a consolidated and highly involved group of stakeholders was created, which has helped considerably in the uptake of the Framework Architecture and the development of compliant national architectures, as originally planned in the KAREN deployment strategy.

Members of the FRAME Network representing national authorities responsible for transport have participated actively in four technical assessment activities. The first concerned the need and priorities for an intermodal extension of the Framework Architecture. The outcome was a clear yes to future evolution and a set of guidelines for the approach.

Experience gained by national architecture developers and by the deployment of the US national architecture (information obtained through our participation in IBEC) was used to make an assessment of the impact of the Framework Architecture in terms of costs and benefits. Since the use of Framework Architecture is still in relatively early phase, only limited hard (quantitative) data could be acquired. However it was clearly stated by those who had already used it as a basis for their own architectures, that this had saved them considerable time and cost, and in addition, had the advantage of creating compatibility with other derived architectures (especially in neighbouring countries). There are now some first examples of implementation and use of national architectures, in which the considerable advantages for the deployment of ITS can be demonstrated.

A further workgroup helped to validate the Framework Architecture from the point of view of the national ITS architectures. The first stage of consultation resulted in series of possible improvements, which contributed to Version 1.1 of the Architecture. In the second consultation, held later in the project, a much wider range of observations and recommendations were obtained, regarding not only the Framework Architecture itself but also the different forms of support. This led to constructive discussions involving the two FRAME projects and the national architecture teams, and resulted in a number of improvements to the Architecture, the related documentation, and the website.

The fourth workgroup validated the user tools being developed by the FRAME-S project, i.e. the Browsing Tool and the Selection Tool. FRAME-NET was thus able to provide general principles and strategy for their development, and by means of a systematic testing and validation procedure, feed-back, which helped to improve the performance and user friendliness of the tools.

For dissemination several roads were followed. Two brochures were published as well as some leaflets. Newsletters were edited at regular intervals and a number of articles placed in European journals. A website, providing practical information on all aspects of FRAME, was created and maintained throughout the project. Presentations were made at the ITS World Congresses, at a number of other seminars, at the meetings of other projects and on further relevant occasions. A substantial database was built up of contacts. This was used for direct mailings to all potentially interested parties.

In summary it can be stated that FRAME-NET has succeeded in creating awareness of the usefulness of architectures in general and the European Framework Architecture in particular as a planning tool for large scale and integrated ITS. Next to that the Framework Architecture is serving as the integrator of architectures through Europe. A solid user community has been built up, consisting above all of the national authorities who have developed their own FRAME-compliant ITS architectures. These are usually supported by the highest political level, and are now serving to guide the national deployment of ITS and as examples of best practice for others. At the national level these architectures can in turn become the nucleus for regional and local follow-up. So it is fair to state that FRAME-NET, in co-operation with FRAME-S, has left an influential legacy throughout Europe, which has considerable impetus, but it is felt that a continued existence and evolution of the Framework Architecture as the European level of reference is nevertheless essential to ensure future evolution while keeping convergence.

6.2 Outlook

A number of member states, with the help of the FRAME projects, have now developed their own European ITS Framework Architecture-compliant national architectures, while others are planning to migrate their existing architectures towards the Framework Architecture. There is a growing number of countries, which have recently decided to follow suit, and are currently planning to develop their own national architecture, with the help of FRAME. The stakes have become high.

The Framework Architecture has become a recognised and valuable asset, on which important national investments have become dependent. While national architectures are evolving, adding functionalities for new services and accommodating new technologies over time, the European reference has to evolve along with them in order to maintain European coherence and compatibility.

As a consequence, a number of member states have recognised the importance of having a European reference. In early 2004 they requested the European Commission not to let their national investments in this area devaluate, but to secure the continuation of support activities after the FRAME projects closed. In response, the Commission called a high level meeting with the member states in June 2004. At this meeting the member states declared the essential role that FRAME had played in their national developments and reconfirmed the need for continuation of activities at the European level. In the mean time, ROSETTA (a 5th FP IST Programme project) had provided recommendations for the requirements of the follow-up of FRAME.

Now national architectures are in place in a number of countries, it is felt that these same countries should have a prominent role in the evolution of the European ITS Framework Architecture. This means that a Forum will be needed where they can actively co-operate and provide, from their national evolution, the input for new user needs and new functionalities. This Forum then would guide a back office performing operational tasks for maintenance, evolution, user support and PR. Specific evolution foreseen is: extension of the Framework Architecture with intermodality, and addition of new services, which are relevant at the European level.

As a consequence, a number of member states have agreed to sign a MoU for international co-operation in the area of ITS architecture and establishing such a Forum. Some have also agreed to invest in it. At the same time the Commission has opened opportunities for new architecture projects in the 6th Framework Programme, which the FRAME partners are considering to propose to in order to cover the inclusion of new functionality and “back-office activities” and help organise the Forum.

Additionally it is felt, that while a number of EC projects continue to develop specific and low-level architectures for certain area's, there's a need to look for mechanisms, also from the EC programme management side, where a liaison and possibly certain requirements to the projects, could provide compliance with the high-level framework of FRAME, there where it is relevant.

ANNEX 1 Overview publications

<i>Date and Type</i>	<i>Details</i>
31st July 2001, Press Release	Basic information on project and start-up, contact details for apply associate membership
its@ertico, October 2001 issue	“Frame off and Running”. Basic project information, information on clustering meeting.
its@ertico, November 2001 issue	“Fall firsts for FRAME” Results of the Clustering Meeting, Results of the international workshop in Sydney
January 2002, FRAME newsletter	Information on working groups, invitation to join in. Invitation to clustering meetin, information on architecture update requesting and FRAME-S training workshops
November 2002, Transport Communications Newsletter	FRAME Navigation Tool featured as “Website of the Day”
The Intelligent Highway, Issue 14, July 2003	ITS Architecture Workshop planned for ITS Worldcongress, Madrid
its@ERTICO, February 2003	“ARTIST Approach to Italian ITS Architecture to provide valuable feedback for FRAME-project”. Full page article on the Italian National Architecture and how it links to the pan-European FRAME framework.
Its@ERTICO, February 2003	“Onsite ITS Architecture Training – for free!” ¼ page information and advertisement on the FRAME workshops
FRAME-net Electronic Newsletter, November 2003	Latest achievements and activities of the FRAME projects
ITS@ERTICO, November 2003	One-page article “FRAME’s full agenda puts ITS architecture ahead
FRAME-net Electronic Newsletter, December 2003	Development of Associate Partners, latest activities
ITS@ERTICO, December 2003 / January 2004	One-Page article about participation in ITS World Congress “ITS architecture and FRAME a focal point in Madrid”
FRAME-net Electronic Newsletter, April 2004	Latest activities, FRAME follow-on
ERTICO Newsletter, June 2004	Cluster meeting, Success stories, FRAME follow-on
FRAME-net Electronic Newsletter, September 2004	Latest activities, Cluster meeting, Success stories, FRAME follow-on

ANNEX 2 Overview participation at events

<i>Date</i>	<i>Title</i>	<i>Number of persons attended + other information</i>
5 th October, 2001	8 th ITS World Congress, Sydney, Australia	1 st Global Workshop with focus on global data repository, standardisation and deployment strategies
25 October 2001	<u>1st FRAME Cluster meeting</u> , Brussels	Information on FRAME Projects, Work Groups and Training Workshops Questions concerning Intermodality
23 March 2002	<u>2nd FRAME Cluster meeting</u> , Brussels	Questions concerning Intermodality
24 May 2002	<u>CEN/ETSI/CENELEC MANDATE 270 meeting</u>	Participation in discussion on standardisation of interfaces and FRAME itself
26 September 2002	<u>COMPRIS kick off meeting</u>	Substantiating the liaison with inland shipping architecture development
10(-12) December 2002	FRAME-S Training workshop for CEE Countries – Brno, Czech Republic	FRAME-NET Project co-ordinator attending the workshop for its evaluation .and for extending the network.
26 (-28) November 2002	FRAME-S Training workshop for Austria – Vienna, Austria	FRAME-NET Project co-ordinator attending the workshop (Day 1) for its evaluation and for extending the network.
7(-9) October 2002	FRAME-S Training workshop for ARTIST (Italy) – Rome, Italy	FRAME-NET Project co-ordinator attending the workshop for its evaluation and for extending the network.
October 2002	ITS World Congress 2002, Chicago USA	<u>2nd Global FRAME Workshop</u> organised, and presentations on FRAME held at Architecture Sessions.
30 September 2002	ROSETTA workshop	Presentation on education and training in FRAME. Discussion on needs and approaches for ITS education and training in Europe.
27 th January 2003	IMAGE Clustering Meeting – Budapest, Hungary	Presentation on the benefits and impacts of the use of an ITS Framework Architecture. 60-70 attendees
11 th March 2003	ARTIST Launch, Rome, Italy	FRAME supporting the launch of a major national ITS Framework Architecture, FRAME presented to the Italian Architecture team by the project co-ordinator.
10 th April 2003	ATLANTIC Road Network Operations Workshop, Birmingham, UK	Co-operation with ATLANTIC project and IBEC on evaluation set up. Presentation of FRAME by project co-ordinator

18 May 2003	<u>IBEC ITS evaluation ws, Minneapolis</u>	Result of co-operation with the ATLANTIC project to discuss and collect non-European data for impact assessment
19-23 May 2003	<u>59th ACI Conference, Riva del Garda, Italy</u>	FRAME promoted during session on ITS by Italian Ministry. Approx 800 participants.
9 October 2003	ISEP Conference, Ljubljana (Slovenia)	FRAME-NET Project co-ordinator attending the conference, FRAME presentation held
20 October 2003	TTS-A Workshop, Vienna (Austria)	Participation in Austrian Telematics workshop on Austrian national architectures
21 October 2003	<u>3rd FRAME Clustering Meeting, Vienna (Austria)</u>	Meeting organised and held in Vienna together with FRAME-S, discussion on benefit and future of ITS architecture projects, 43 attendees.
16 – 20 November 2003	ITS World Congress & Exhibition, Madrid (Spain)	Participation in Congress and Exhibition, presentations in ITS Architecture session and <u>3rd FRAME Global Workshop held</u>
21 January 2004	Mobility conference exhibition	FRAME presentation
23 March 2004	<u>FRAME-S seminar at Direccion general de trafico, Madrid (Austria)</u>	Seminar on the need for an ITS system architecture
2002	US workshop on ITS Architecture	FRAME seminar
24-26 May 2004	ITS Europe Congress in Budapest, Hungary	Preparation of 4 th FRAME Global Workshop on ITS Architecture. Presentation in technical sessions on ITS Architecture.
23 September 2004	<u>4th FRAME Cluster Meeting, Vienna (Austria)</u>	Meeting organised and held in Vienna together with FRAME-S: · The new version and available tools of the European Architecture, Overview of ITS Architectures in Europe.

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ANNEX 3 Associate members

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