E-FRAME

THE FRAME ARCHITECTURE AND THE ITS ACTION PLAN

Booklet of the E-FRAME Project, June 2011

CONTENT

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Introduction

Action Area 2.3 of the EU ITS Action Plan requires the use of ITS Architectures to support the European objectives of the Plan. This booklet explains how the European ITS Framework Architecture, also known as the FRAME Architecture, provides a suitable basis for this task. The principal reasons are:

- The FRAME Architecture covers almost all of ITS. Most of the applications and services mentioned in the ITS Action Plan are contained within the FRAME Architecture.
- The FRAME Architecture does not impose any technical or organisational assumptions on the way things are done – it is thus suitable for use within the ITS Action Plan.
- The FRAME Architecture enables a system structure to be described in a technology independent way so that, as technology evolves, all the higher level requirements can remain unchanged.
- The FRAME Architecture was first published in 2000 and has been used to create ITS Architecture subsets for Member States, their regions, as well as for RTD projects.

What is an ITS Architecture?

- A high-level design that defines the structure, behaviour and integration of a given system in its surrounding context.
- A description which forms the basis for a class of systems and hence for a set of low-level designs.
    - Different low-level designs can be created by different manufacturers;
    - Adherence to the ITS Architecture ensures inter-operability.
- It ensures an open-market for services and equipment, because there are “standard” interfaces between components.
- It ensures consistency of information delivered to end users.

ABOUT THE FRAME ARCHITECTURE

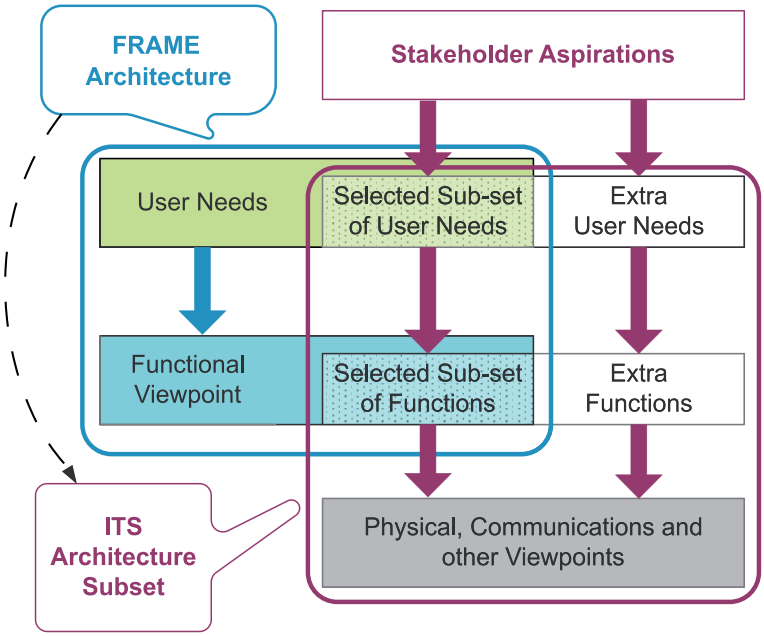
Following the recommendation of the High Level Group on Telematics, and a resolution of the Transport Council, the European ITS Framework Architecture, colloquially known as "The FRAME Architecture", was produced by the EC funded project KAREN (1998-2000). It has been maintained and enhanced continuously since then – with cooperative systems being added by the current project E-FRAME (2008-11). Clearly this architecture is a candidate for use by those who are implementing the ITS Action Plan.

Because the FRAME Architecture is intended for use within the European Union it conforms to the precepts of subsidiarity, and thus does not mandate any physical or organisational structures on its users. Hence the FRAME Architecture makes no assumptions about the way that things are done.

The FRAME Architecture was created to provide a common approach, or "language", for use throughout the EU so that the implementation of integrated and inter-operable ITS can be planned.

It is a framework architecture from which logically consistent sub-sets can be created, which can then be used on their own. The methodology is supported by computer-based tools, and begins

The process of creating an ITS Architecture Sub-set



with the wishes, or aspirations, of the various stakeholders for ITS applications and services. These are identified within the FRAME Architecture and a sub-set is selected. The sub-set is then customised to fit the region in which they are to be deployed. See pages 6 and 7 for further explanations.

Scope of the FRAME Architecture

The FRAME Architecture now covers the following areas of ITS:

- Electronic Fee Collection
- Emergency Notification and Response – Roadside and In-Vehicle Notification
- Traffic Management – Urban, Inter-Urban, Simulation, Parking, Tunnels and Bridges, Maintenance, together with the Management of Incidents, Road Vehicle Based Pollution and the Demand for Road Use
- Public Transport Management – Schedules, Fares, On-Demand Services, Fleet and Driver Management
- In-Vehicle Systems – includes Cooperative Systems
- Traveller Assistance – Pre-Journey and On-Trip Planning, Travel Information
- Support for Law Enforcement
- Freight and Fleet Management
- Provide Support for Cooperative Systems – specific services not included elsewhere such as bus lane use, freight vehicle parking
- Multi-modal interfaces – links to other modes when required, e.g. travel information, multi-modal crossing management

FRAME Forum

The FRAME Forum was set up in 2005 to promote the use of the FRAME Architecture, and to govern its maintenance and evolution. It is currently being restructured and reorganised for the new scenario created by the ITS Action Plan and ITS Directive, and to enable more users of the FRAME Architecture to be involved. New members are welcome to contribute to this task!

Further information will be found at **www.frame-online.net**

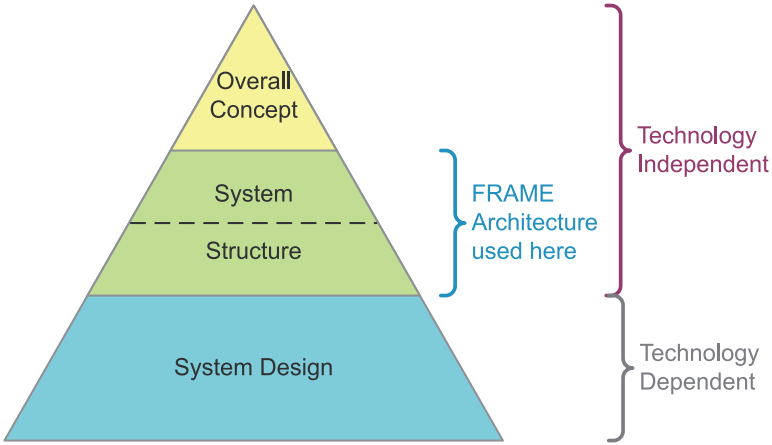
USING THE FRAME ARCHITECTURE

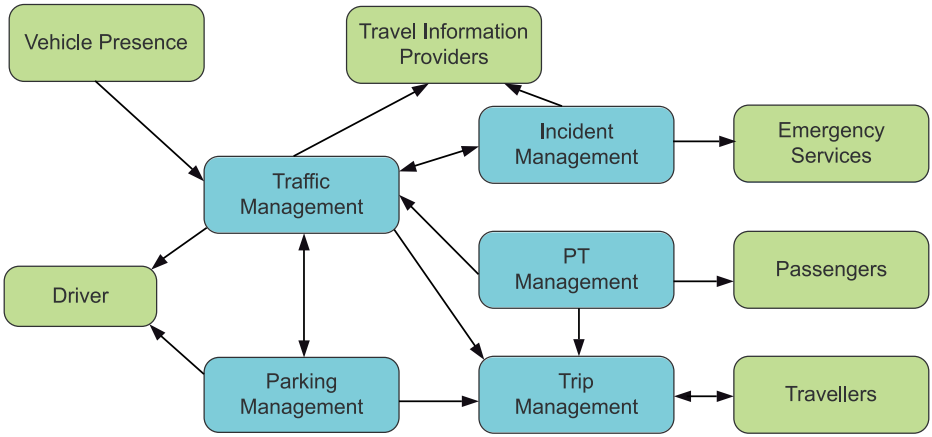
The FRAME Architecture is intended to be used within a top down approach to the planning and deployment of integrated ITS. The overall concept may, or may not, be represented in a formal (reference) model. Since the creation of a reference model requires a number of decisions or choices to have been taken by those implementing and/or regulating ITS, the FRAME Architecture does not provide one.

The overall concept and the system structure should be described in a technology independent way so that, as technology evolves, all the higher level requirements remain unchanged. The information contained within the system structure enables the ITS industry to produce the equipment and systems that will provide the services wanted by the stakeholders, each with their own distinctive features, but conforming to the purposes expressed in the overall concept and system structure. Thus integrated and/or inter-operable ITS Services can be provided across the EU.

The system structure contains a number of viewpoints. The functionality needed to implement ITS Services is provided by the **Functional Viewpoint,** which does not impose any specific technical solutions on its users. Each specific implementation requires choices to be made by the stakeholders, in particular which components will be used for the ITS implementation and the links between them (the **Physical Viewpoint**).

The use of the FRAME Architecture in the ITS planning process





Components of an ITS implementation – The Physical Viewpoint

Further analysis, also based on specific choices or decisions, can then provide:

- **Communications Viewpoint** – the requirements for communications between the components
- **Organisational Viewpoint** – who owns, manages and operates each components and other organisational issues
- **Information Viewpoint** – information that is used, its attributes and relationships

The content of the **Physical Viewpoint** and the **Communications Viewpoint** can be included in Calls for Tender to enable the components and communications to be procured and deployed. The **Organisational Viewpoint** is used to enable the correct management structure, plus rules and regulations, to be put in place so that the services can be correctly provided.

Further information on the FRAME Architecture can be found at **www.frame-online.net**.

FRAME AND THE ITS ACTION PLAN

Although a number of other ITS Architectures do exist, most of them include certain technical or organisational assumptions and none has been used as extensively around the EU as the FRAME Architecture. It is a mature and proven product with an ever increasing number of users, and hence an increasing knowledge base. It can therefore be used immediately to support the ITS Action Plan.

- Most applications and services mentioned in the ITS Action Plan are also mentioned in the FRAME Architecture.
- New ideas are a feature of ITS, and the FRAME Architecture methodology enables them to be included immediately in a sub-set ITS Architecture. It has thus been used successfully in RTD projects such as COOPERS. When such new ideas become established they can be included in a later version of the FRAME Architecture, as has already been done for Cooperative Systems by the E-FRAME project.

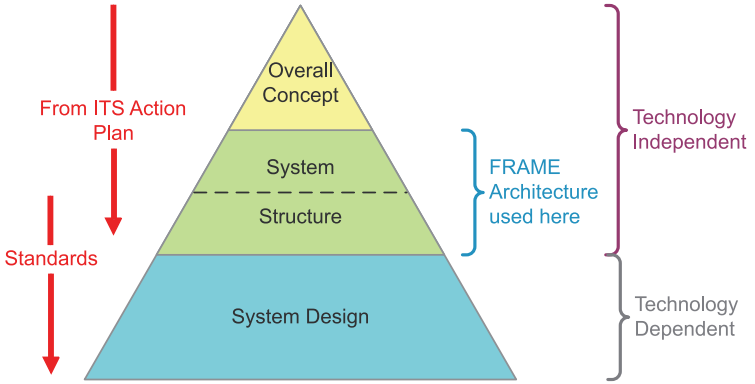
Multimodality

The FRAME Architecture includes functionality to support data exchanges with other modes.

System Design – Technologies

In many places the ITS Action Plan refers to specific technologies, e.g. the EGNOS/Galileo positioning system, RFID and open in-vehicle platform architecture. Such technology dependent issues should not be visible within an ITS Architecture, but the functionality they provide should be, and most – if not all – is already within the FRAME Architecture. The ITS Architecture defines the various interfaces that exist between components, and the use of specific technology at

Architecture Layers and the EU ITS Action Plan



those interfaces needs to be covered by standards, whose use may be mandated through the ITS Directive.

Supporting the ITS Action Plan

Once the European Specification for each ITS application and service has been agreed, an ITS architecture for it can be created using a sub-set of the FRAME Architecture. This will enable the required standards to be identified and, if necessary, their creation initiated. It will also provide a technology independent description of each application and service so that manufacturers and suppliers can ensure their products will work together as required. This creation of each European Specification should be done by a team of experts in the topic under consideration, with the addition of a small ITS Architecture team who will also ensure a common "look and feel" to the result.

This process will inevitably result in the creation of Physical, and possibly other, Viewpoints for use throughout the EU. These can then be used directly by, for example, application developers allowing them to respond to a quickly changing market but preserving the links to the overall structure. Thus, over time, the need for separate bespoke ITS Architectures within Member States, or parts of Member States, may diminish.

Advantages of this Approach

- **Common Language** – Each resulting ITS Architecture will be based on the FRAME Architecture, and thus use the same terminology.
- **Common elements** will be easy to identify, as will be the merging of two or more ITS Architectures. Thus will be important as Member States with their own ITS Architectures need to include those that result from the ITS Action Plan or ITS Directive.
- **Efficient** – The FRAME Architecture already exists and contains about 80 % of the work that will be needed to be done to create the ITS Architectures.

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