FRAME NAVIGATION TOOL FOR EASY USE OF THE EUROPEAN ITS FRAMEWORK ARCHITECTURE

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SUMMARY

This paper describes the way that the FRAME-S Project is developing the tool for making the use of the European ITS Framework Architecture -that is a very large product, made up of a number of different documents- easier. The FRAME Browsing Tool provides you with support for navigating the European ITS Functional Viewpoint. As regards the design of new ITS systems based on the European Architecture, you have the ability to exploit the help of an automatic assistant: the FRAME Selection Tool.

THE NAVIGATION TOOL

The objective of the FRAME Navigation Tool is to provide users of the Framework Architecture with two principal features:

- The ability to browse through the European ITS Framework Architecture, following related elements and being provided with their definitions.
- The ability to select a sub-set of the European ITS Functional Viewpoint that satisfies a sub-set of the European ITS User Needs, and then to create a corresponding Physical Viewpoint of that sub-set.

Since the FRAME Project uses the MEGA Process Tool for updating and maintaining the European ITS Framework Architecture, providing access for “browsing” has been easily achieved by exporting an HTML version of the European ITS Framework Architecture for viewing with a proprietary browser such as MS Internet Explorer, or Netscape Navigator. The export is done using a facility of the MEGA Process Tool that requires design of templates for each page.
The facility for selecting part(s) of the Framework Architecture (from which specific Functional or Physical viewpoints can be created) has to be provided in a way that does not impose high costs on the users, and that enables modifications to the resulting viewpoints (or system) to be made using any tool, not only MEGA Process. After consultations with the representatives from the user community involved in FRAME-NET, it was felt that the best way to do this was to create an “open” export file, which would be both a well-documented “vehicle” for the widest possible use of the European ITS Framework Architecture and the database to be used by the Selection Tool.
The choice of MS Access tables for the “open” export file of the European ITS Framework Architecture (created from the MEGA Repository) is motivated by the fact that many

potential users are likely to have Microsoft® Access already.
ITS Architecture developers with Mega Process can always use the Mega Process Repository (see Figure 1).

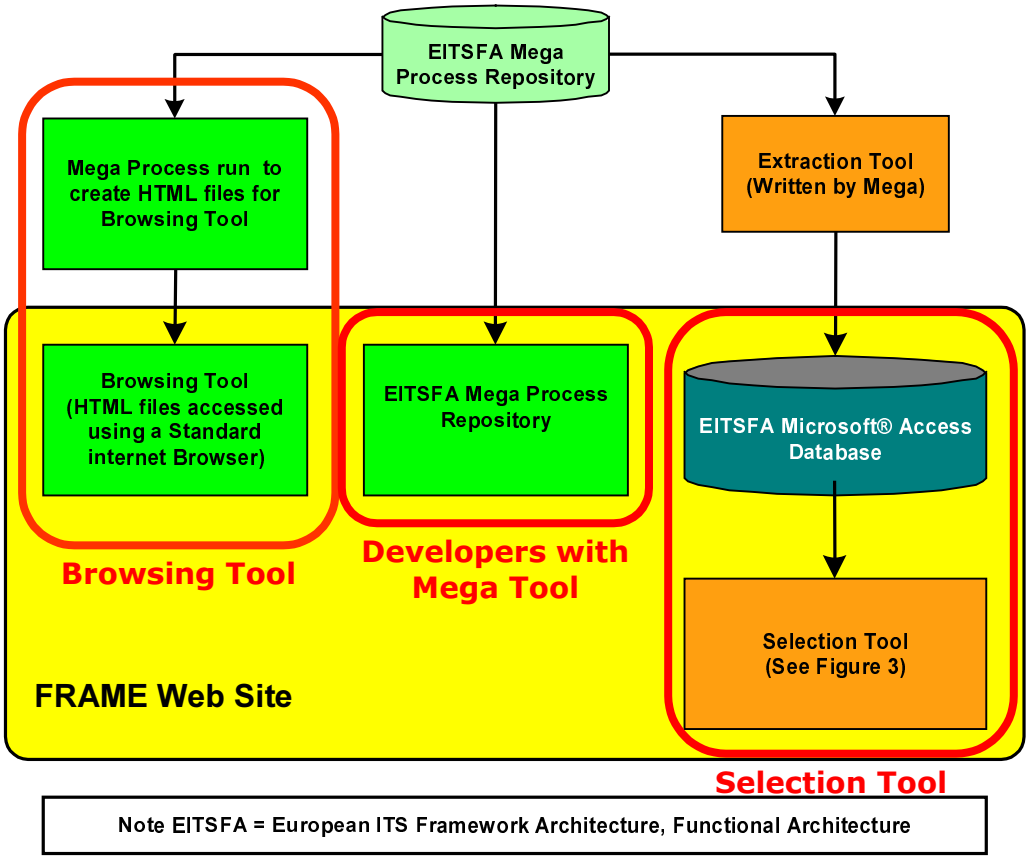

Figure 1: FRAME Tools

The Browsing and Selection Tools are therefore separate entities that use different files, although they are representations of the same source.
The remainder of this article is focused on the Selection Tool, explaining what it can be used for, how to get and run it, etc.

WHAT DOES THE SELECTION TOOL HELP YOU TO DO?

Background

The European ITS Framework Architecture is a large product, made up of a number of different documents, including a set of User Needs that define the services to be provided, and the Functional, Physical and Communication Viewpoints that show how these services can be provided. It also contains other supporting documentation, such as the Deployment Approach, the Cost Benefit Analysis, and the Risk Analysis.
In fact, the Functional Viewpoint is itself a large document many hundreds of pages long: it covers the areas of Traveller Journey Assistance; Traffic Management; Public Transport Operations; Freight and Fleet Operations; Advanced Driver Assistance Systems; Safety and Emergency Facilities; Support for Law Enforcement; and Electronic Payment. Each area is composed of many Functions, Data Flows and Data Stores (both the Functions and the Data Flows have an hierarchical structure). The interaction between the Functional Viewpoint and the world outside is described through Terminators and Actors.

Therefore to go from User Needs to the Physical Viewpoint of a particular application you first have to carry out a number of steps to determine the sub-set Functional Viewpoint:

- Identify the User Needs that define the service(s) to be provided.
- Select Functions from the Trace Table, which provide a cross reference from User Needs to the Functions that help to satisfy them.
- Identify their Functional Areas or Sub-Functional group (DFD).
- Confirm that the selected Functions are reasonable.
- Confirm that those Functions "nearby" but not selected, should be omitted.
- Select the Data Flows needed by the selected Functions.
- Select the Data Stores needed by the selected Data Flows.
- Select the additional Data Flows needed by the selected Data Stores.
- Identify the Terminators associated with all these Data Flows.
- At this stage some of the input Data Flows that are required by the selected Functions may not have a source or a target, and some Functions and/or Data Stores many not have any associated Data Flows at all. It is therefore necessary to identify these inconsistencies and errors in the resulting sub-set Functional Viewpoint, and to correct them.

To create a description of how the sub-set Functional Viewpoint can be deployed as a Physical Viewpoint:

- Allocate Functions and Data Stores to Physical locations (Sub-Systems), and sometimes to Modules within the Sub-Systems.
- Define the Physical Data Flows that need to pass between the Sub-systems, Modules and the outside world (represented by Terminators and Actors).

Advantages and facilities provided by the FRAME Selection Tool

The activities needed to create an Architecture sub-set, starting from a sub-set of the User Needs, are quite demanding and time-consuming, especially if you can only rely on paper documentation. The task is made a little easier using the FRAME Browsing Tool, which provides hyper-linked access to the components of the European ITS Functional Viewpoint via an Internet Browser. But the situation is completely different if you have the ability to exploit the support of an automatic assistant as the FRAME Selection Tool.
In fact, the Selection Tool provides guidance and help in each step of the long process just described:

- In the first screen of the Tool (see Figure 2), it is possible to consult the whole list of User Needs (that are structured into four levels), read a description for any element from this hierarchical structure, and thus decide which User Needs (i.e. the services to be provided by the Sub-set Functional Viewpoint) are indeed required. The selection of User Needs is then automatically saved, so that it is not necessary to take note of any choice.
- In the second screen (see Figure 3) it is possible to view the Low Level Functions that help to satisfy the User Needs that have just been selected. From this suggested list, it is possible to choose the Functions that are actually needed; once again the selection made is automatically saved by the Tool.
- In the third screen (see Figure 4) it is possible to consult the Data Flows associated with the Low Level Functions that have been selected, and, according to their descriptions, identify which of them are actually needed.
- And so on…

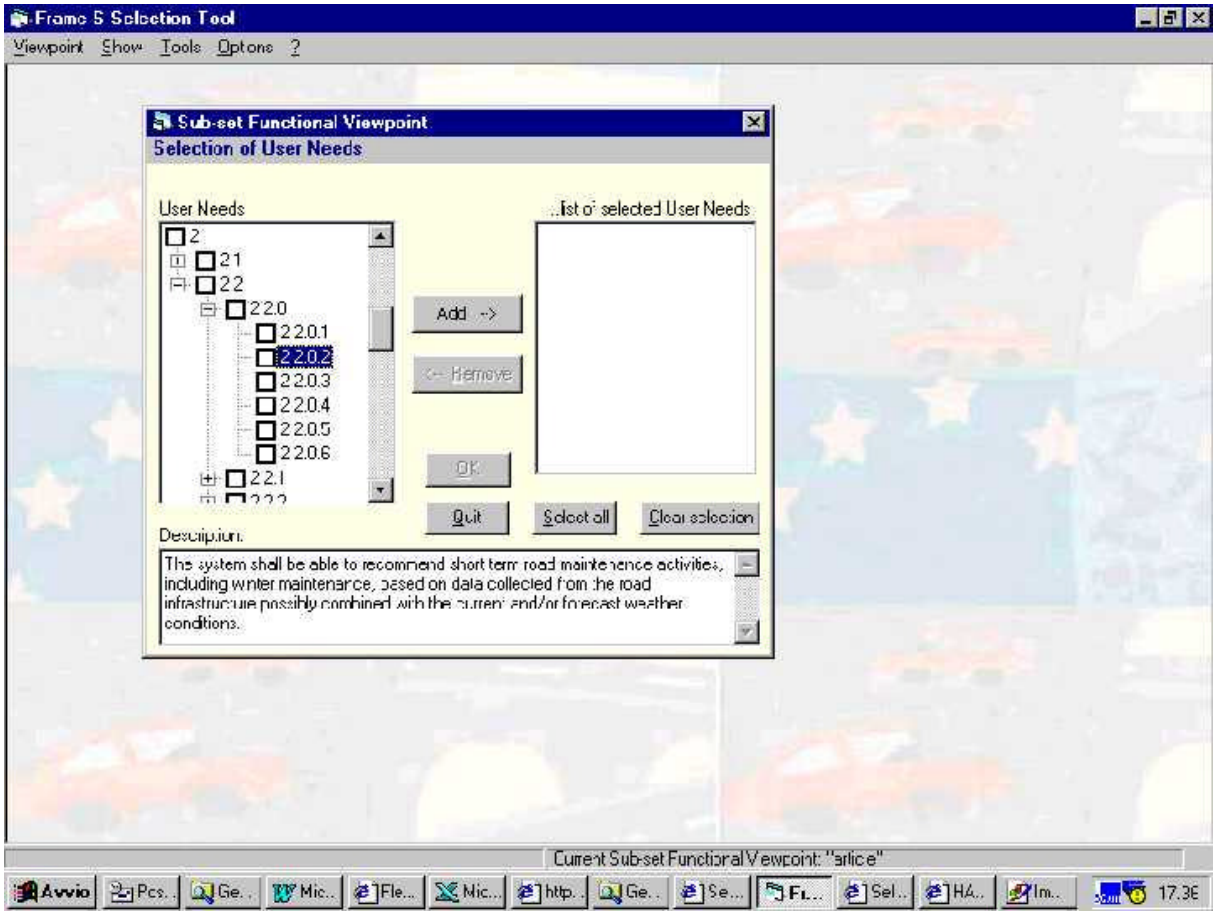

Figure 2: Selection of the User Needs

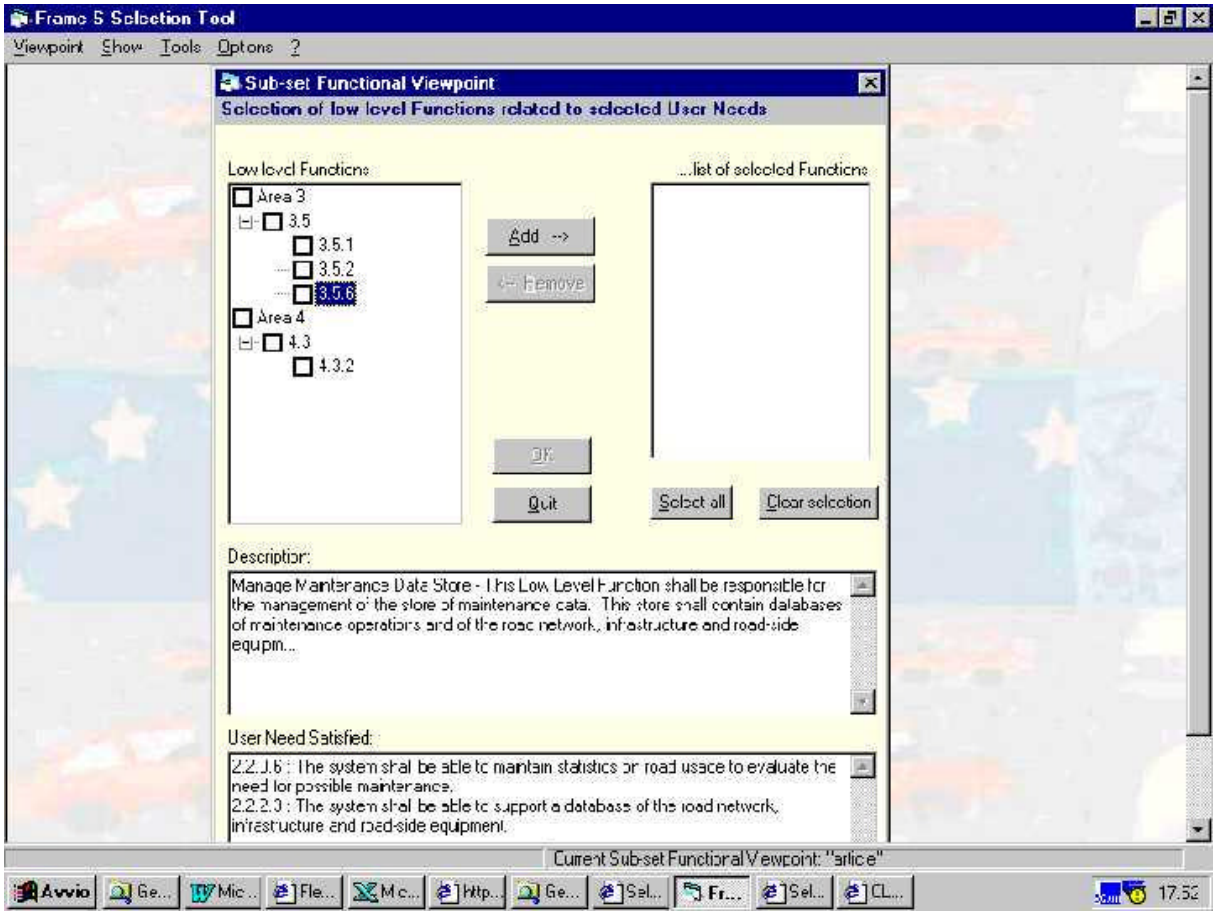

Figure 3: Selection of the Functions

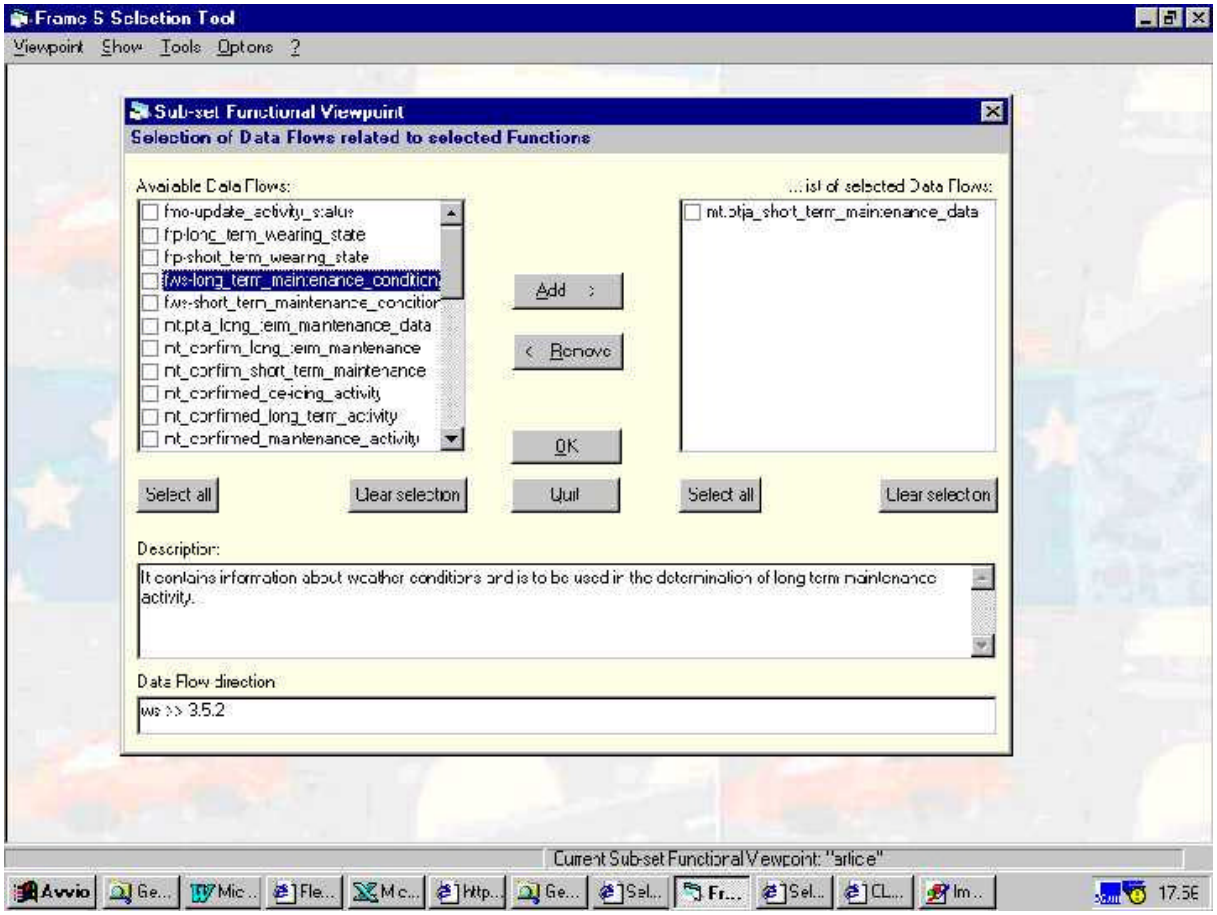

Figure 4: Selection of the Data Flows

As described above for the very first part of the selection process, the Selection Tool, however, does not do all the work for you: the design choices are always left to the ITS engineer, but he or she is released from most of the routine activities such as: finding the description of a specific Function, Data Flow, Data Store, Terminator or Actor to decide whether it has to be included or not; determining what are the Data Flows associated to a specific set of Functions; etc. Thus the Selection Tool will assist in the creation of a logically consistent Architecture sub-set, but not a semantically consistent one.
Once the Selection Tool has been used to select a sub-set Functional Viewpoint, it is expected that some users of the Navigation Tool may wish to add additional elements (e.g. User Needs, Functions, Data Flows, etc.) in order to create a full National, Regional or Service Architecture. The provision of these facilities is outside the scope of the FRAME Project, but other mechanisms are available for achieving the same results, e.g.:

- To modify (i.e. add features to) the Selection Tool produced by the FRAME Project (the "source code" is in the public domain).
- To modify the exported Database and/or report(s) describing the sub-set Functional and/or Physical Viewpoints created by the Selection Tool.
- To import the Database created by the Selection Tool into another suitable tool.

The current version of the Selection Tool does not provide the user with an automatic facility for drawing the diagrams. Even though this feature would clearly be very useful, for budgetary reasons it has had to be left for a future enhancement after the current FRAME projects have finished.
From April 2004 the first public version of the Selection Tool will be available for downloading from the FRAME website (www.frame-online.net). Since it is a free-standing

application, once the user has downloaded the file and installed the Tool on a personal compiter, it can be used without the need of an Internet connection. The Tool will be backed with support documentation that will be available in two forms:

- User Manual (a PDF file);
- Help on line, accessible from the various windows of the Tool.

Guidelines for use of the Selection Tool at a national level

At a national level two different uses of the Selection Tool can be identified:

- an example for the development of a completely new tool that fits the national-specific needs better;
- a base structure to modify and/or improve through the addition of different or new facilities.

With regard to the first option, the package, which includes the software application, the data base, and the User Manual (that will be all available from the FRAME Web Site) is adequate for achieving the target.
With regard to the second option, the source software code of the Selection Tool is needed. This code is in the public domain, and therefore capable of being modified by any user that wishes to do so. The national teams can submit a request to receive a full copy at info@frame-online.net, the official contact point of the FRAME Projects.