ACTIF – A tool addressing the challenge of sustainable mobility in public transportation.

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1 – A tool promoting sustainable mobility.

Sustainable mobility has become a recurring theme for national and European transportation policy. In preferring the name "Ministry for Ecology, Sustainable Development and Spatial Planning" to "Ministry for Transport and Public Works", the government has shown its will to encompass these fields in its policy. The fundamental issue of this concept is to allow the development of goods and passenger transport whilst respecting environmental concerns (air safety, energy consumption reduction…), in addition to safety, security, and user requirements.

Very often (in a lot of minds), "sustainable mobility" is associated with "Intelligent Transport Systems" (ITS) which in particular provide tools for more effective, efficient, secure, and reliable services, thereby helping the modal shift from individual road transport means to more environmentally-friendly means: ships, riverboats, trains and public transport.

ITS, which apply new information and communication technologies to the world of transport, can provide service operators (infrastructure managers or transport operators) with additional information, enabling them to better manage their activities. They can allow improved services to be offered to users, which are more reliable, more efficient, and provide more information. For example, in the public transport field, ITS are applied in the implementation of operating aid and traveller information systems. However, in many cases, ITS alone cannot lead to "sustainable mobility". Why? Because, for the most part, ITS solutions are implemented within the scope of one operator, one specific activity, and one service, whereas overall service involves many more stakeholders.

Sustainable mobility relies on two main concepts: firstly, co-modality which aims to achieve complementarity between the different modes of transport in order to best meet overall transport requirements (and not focus on the needs of one particular mode of transport); and secondly, interoperability, i.e. the ability for two or more stakeholders, at least, to exchange information, or better still collaborate, and even better, to share common tools.

In the public transport domain, examples can be found in electronic ticketing, with common payment or validating systems. Before implementation, such systems require prior agreement between stakeholders, relating to receipt allocation, according the fare structures and service consumption, or the calculation of compensation data...

However, interoperability is not achieved easily. By nature it is complex to develop as it involves several actors who may each have their own profession-based logic, with often conflicting requirements and objectives. It is not at the technical level that ITS problems are solved. In fact, it is more often at this level that interoperability problems are discovered. Worse, the fact that technical systems cannot interoperate can sometimes become the pretext for curbing co-operation initiatives between bodies and organizations, leading to a breakdown in co-modality.

Within this context, it is the role of central government to assist transport authorities and their partners in the development of more efficient services that take into account the logics of the various different actors. In addition to participation in standardization work, proposals for regulatory frameworks, the dissemination of doctrines and direct assistance to project owners, the scientific network of the French Ministry of Ecology has also begun to promote operational frameworks that can act as design-aid tools, enabling the development of efficient transport systems.

ACTIF, which stands for «assistance in the design of interoperable transport systems in France», forms part of this policy. As its name indicates, the project, which was launched in 2000 by the Ministry of Transport and co-funded by the European Commission, provides transport system project managers with an operational « tool-kit » enabling the design of interoperable solutions.

The purpose of this paper is to show what ACTIF is, how we can use it and what it can enable, in particular in the public transport domain.

2 – ACTIF's method –a way to conceptualize and build interoperable projects

A design-assistance « kit » naturally requires a set of documents describing the method used, the different elements of the kit and their use. In ACTIF, the basic element made available to designers, independent of the model and the tool, is a handbook outlining a method for designing transport systems in an interoperable manner. Developed in 2003, this methodology is based on project management practices that specifically take into account several actors, systems and projects. The six phases listed are in fact similar to those used within the scope of any typical project management.

In a project's kick-off phase, requirements are identified. In particular this phase must enable the different scopes to be determined (functional, geographical, institutional….) along with the likely actors and their relative roles. These actors must in turn express their needs with

regards to the identified project. The iteration of these needs must be kept concise so as to avoid broadening the project's scope excessively.

The second phase consists in analyzing the existing situation. The third phase enables several functional and physical architectures to be defined. Choices must be made so as to clearly allocate functions and responsibilities between organizations and information sub-systems. The fourth and fifth phases are more operational as they involve developing an implementation plan (based on several scenarios) and applying it.

The sixth and final phase is essential: as in urban planning, it involves checking that the different elements of the overall project come together in a way that is conform with the initial plan and if necessary adjusting the « urban planning rules » to deal with changes in the project environment (regulatory, technical, functional changes….). This supposes defining and maintaining ad hoc project steering groups throughout the system's life cycle.

It is on the basis of this reflection that a proposal arose for a «tool-kit» enabling the method to be applied to concrete projects. At the most basic level, it was a matter of identifying the main needs of project designers. Experience rapidly showed that their needs develop long before technical solutions can be envisaged: they lie at the limit between functional aspects and organization and profession-related logics. In fact interoperability issues arise at the interfaces between organizations and are translated by the identification of necessary data flows between data acquisition and dissemination functions located at specific levels of profession-related processes. This leads to difficulty in establishing common vocabulary that is necessary for the comprehension of processes and the dissemination of information that is understandable by all actors.

3. ACTIF's model: a professional repository enabling the sharing of knowledge

The need for comprehension between organizations and actors shows the need for a clear vision of the internal logics of each profession and the interfaces where information may be exchanged. The ACTIF model therefore proposes illustrations of the data acquisition, processing, storing and dissemination processes for various transport professions. It highlights the potential interfaces between professions and actors by identifying the source of entry data and those targeted to receive the processed data.

Since the beginning of October, version 5 of the ACTIF model has been available. Some important improvements have been made, thanks to concrete applications of the model to local projects. At a first glance, it could seem similar to the FRAME project: the same modelling hardware tool (MEGA international) has been used, with the same legends, meta-objects and framework. However, applying the ACTIF model to real projects enabled the management team to improve its consistency, thereby making it more legible, understandable, useful, and user-friendly.

The transport professions are grouped into nine functional areas:

- provide electronic payment systems,
- manage safety and emergency services;
- manage transport infrastructures and their traffic;
- manage public transport operations;

- provide advanced driver assistance systems;
- coordinate and inform on multimodal transport;
- enforce regulations;
- manage freight and fleet operations;
- manage shared data.

There is one more than in the FRAME model. The ninth functional area meets two different requirements. The first one relates to repository management, which is essential from a consistency, coherency and data comparison point of view. For example, implementing a multimodal information system in an urban area first requires uploading comparable data. This means proposing common reference documents, such as maps (with transport infrastructure, bus lines, bus stop codification, addresses…), timetables, travel time calculation. The second requirement is the sharing and re-use of data: this allows data archiving, in order to produce assessments, or develop an observatory at a regional level (refer to the use of ACTIF for the data management system in the Franche-Comté Region). This aspect has been introduced into French law, which obliges public authorities to implement multimodal information systems and transportation observatories.

The second improvement consists of a description of the different objects (functions, data-flows, data-stores, terminators…) that is not specific to a particular mode. The first versions of the ACTIF model stemmed directly from KAREN (and later on, FRAME), which describes transport professions linked with road activities. For example, the "manage traffic" functional area was clearly road management orientated, and the "provide advanced driver assistance systems" functional area essentially concerned cars and trucks. The will to apply ACTIF to maritime, waterways or rail projects highlighted that the different profession-based logics were in fact very similar and this analogy enabled common modelling rules to be proposed.

This helped to provide links between projects concerning both railways and road (for example, the travel information masterplan in the Ile-de-France region) and raised the question of the possible application or transposition of certain specific standards to other modes (automatic identification systems for maritime on waterways transport, use of standardized messages between road managers and operators etc).

The third improvement concerned the extension of ACTIF's scope: some professions, like hub management, managing the reservation of transport infrastructure use (like sea motorways), or warehouse management… were not previously described. This initially resulted from the consideration that their actors are not directly part of the world of transport. However, as they form part of the transportation supply chain, their logical connections with the other stakeholders should have been described in ACTIF.

These modifications allowed the modelling rules developed in version 4 of ACTIF to be applied in a more regular manner. This improvement also concerned the "electronic payment" and "public transport" functional areas, whose descriptions are now very close to those of TRANSMODEL. In particular, for the former, the description is now sufficiently independent from technical levels that the question can be asked as to whether it is still necessary to keep the word "electronic".

4. OSCAR: A SIMPLIFIED TOOL FOR SYTEM ARCHITECTURE DESIGN

The modelling tool MEGA allows the model's consistency to be verified. It also allows the production of a web-site to render this organized knowledge accessible. Each object is represented in clear diagrams and linked with an html-page, which presents its description and the links with other objects (functions, data flows, and related standards). However, a model presents each object once. On its own, it does not allow the overall conceptualization of transport system projects when this implies different organizations sharing the same activities and responsibilities.

The OSCAR tool was created to enable the requirements of different organizations to be taken into account. In principle, this involves identifying the different sub-systems that play a role in the functioning of the overall project, defining the functional scope of each one and highlighting the terminators with whom they interact. By identifying their relation with objects within the model, the OSCAR tool enables the identification of the links that exist between the different sub-systems and terminators, and the interfaces that must be created.

For example, in the case of the Toulon urban area, the challenge was to co-ordinate the public transport operators, so as to be able to offer a seamless service. The use of OSCAR allowed the modelling of the interfaces not only between public transport operators (including a maritime transport line), but also with road managers: an event on a road can lead to maritime service modification.

The use of OSCAR enabled simple diagrams to be produced presenting public authority issues, an analysis of existing services (highlighting lacking or redundant elements), and thanks to the tool's ability to propose different scenarios, it was possible to define a common target system, which described the role of each partner (sub-systems) and clearly distributed responsibilities.

5 – Conclusion: the importance of a good understanding for sustainable mobility.

A tool-kit like ACTIF proposes shared knowledge and methods in order to help stakeholders find common solutions for co-operation. However, on its own, it is not sufficient. The implementation of transport systems is complex: it requires the clear will of each stakeholder to participate at the design stages but also requires their efforts for project implementation and maintenance. This implies that there is a need for agreement concerning data ownership, so as to safeguard the interest of each party.

However, in the initial stage, the stakeholders have to sit down at the same table to try to understand each other's needs. The different ACTIF case studies, in the Toulon area, in Montpellier (multimodal transportation co-ordination), in the Franche-Comté region (shared data management), in the Alsace region (multimodal information system) have shown that this constitutes the primary contribution of ACTIF. Follow-up activities will involve continuing the promotion of such a tool by sharing and capitalizing on experience.

The ACTIF case study reports are available on the ACTIF-website, the ACTIF model can be browsed and the OSCAR tool can be downloaded free of charge. Training courses are regularly proposed (3 per year). New versions of the ACTIF model and tool will be proposed in order to update the standards, introduce new professions, and improve the usefulness of ACTIF as a whole. Capitalization is also planned at the European level, by participation in on-going international projects, enabling a better understanding of sustainable mobility.