ITS Observatory

User needs for an ITS on-line tool

Panagiotis Iordanopoulos
Hellenic Institute of Transport (HIT)
Centre for Research and Technology Hellas (CERTH)
Thessaloniki, Greece
panior@certh.gr

Simon Edwards
Transport Operations Research Group
University of Newcastle upon Tyne
Newcastle upon Tyne, UK
NE17RU
Simon.edwards@ncl.ac.uk

Svetlana Popova
ERTICO – ITS Europe
Brussels, BELGIUM
s.popova@mail.ertico.com

Abstract—The current status of ITS deployment around Europe is characterized by lack of Standards for ITS implementation at EU level, limited cooperation among the various related IT Stakeholders and more importantly lack of wide awareness of the results and outcomes deriving from numerous and significant investments in ITS throughout Europe. This knowledge fragmentation can be reduced through the development of the ITS Observatory, a flexible and user-friendly, open source of knowledge for ITS Deployment in EU and abroad. The current study presents the user needs and requirements for this unique ITS Observatory.

Keywords—*Observatory; ICT; user requirements, market place, community*

I. INTRODUCTION

Although Europe has made significant investments in ITS, where many useful and informative studies have been completed, the awareness of the results remains limited and access to them is very restricted. Moreover, the lack of standards for ITS implementation at EU level creates a significant variance in how ITS developments and operations are implemented technically, thus posing additional barriers towards interoperability and cooperation among the various related stakeholders and the policy decision makers of the EU member states [1]. This limited cooperation leads to fragmented knowledge among all related actors regarding existing ITS solutions and their benefits, as well as the most efficient business models for further deployment of ITS applications. Hence, due to the lack of information, European ITS stakeholders are duplicating investments, and in some

aspects re-inventing the wheel instead of building on existing knowledge and lessons learned.

In order to bridge the knowledge gap, the ITS Observatory, funded by H2020, is being developed in order to become a unique and open source of knowledge on ITS Deployment. The main objectives of the project are to combat fragmentation of through the creation of a comprehensive data set on the “what”, “where” and “who” of European ITS, to support ITS deployment by creating a user-friendly knowledge base, to help users find and compare results of research, pilots and deployment projects and to create an interactive information marketplace with features to help and support a dynamic ITS community of public authorities, system owners and suppliers, service providers and users.

Fundamental to the design for the ITS Observatory is the development of an understanding regarding user requirements. To achieve this, direct engagement, discussion and consultation among a range of stakeholder decision bodies – including national transport agencies, national highways authorities, local governments, sector representational groups, private stakeholders, etc. has taken place. The current study presents the engagement strategy developed in the framework of the project, the analyses of the results from direct contact with stakeholders through workshops, focus groups and questionnaires, and presents the mechanism applied to identify and then classify the full range of user requirements from the viewpoint of strategic planning and decision making process of a funding body. The final results include requirements and recommendations for the ITS Observatory specifications and architecture from both data feeder and user perspective. More

specifically, in the first part the engagement methodology applied is described followed by analysis of the results from a generic survey questionnaire. This is followed by the description of the method and results from one-to-one interviews made to a smaller representative and high level cohort of ITS Observatory stakeholders and a focused questionnaire survey executed during a workshop-presentation of the ITS Observatory Beta version (not released version, fairly close in look, feel and function to the final product) in February 2016.

II. ENGAGEMENT METHODOLOGY

Stakeholder engagement is the process used by an entity to engage relevant stakeholders for a purpose to achieve accepted outcomes [2]. The stakeholder engagement usually aims at one or several of the following objectives:

- Involve the users and end-users of a system/service/platform in the design phase by providing user requirements and feedback on its design
- Enrich the content and/or increase the use of a system/service/platform by promoting its use to key stakeholders
- Enlarge the geographical and thematic scope of a system/service/platform by including stakeholders representing different regions and/or domains
- Provide advice and support in the interpretation of the results obtained and the impacts measured from the use of a system/service/platform
- Be updated and follow international standards during the development of the system/service/platform databases and processes

In order to achieve the above for the case of the ITS Observatory, a detailed stakeholder engagement strategy was defined and implemented through the execution of the following steps:

- Stakeholder identification and mapping: All relevant stakeholders were identified and classified based on qualitative indicators related to their role and contributions to the ITS Observatory. In addition, the short and long term goals of the participation of each stakeholder group were clearly defined.
- Communication plan definition: Detailed communication and engagement plans were defined for each stakeholder group based on the feedback and contributions that the ITS Observatory expect from them as well as in the interaction that will be established with them.
- Tools definition: Dedicated tools for interacting with the stakeholders were developed in order to both facilitate their participation and improve the output of their support.
- Engagement: The tools were used for the user engagement process following the provided communication and engagement plans aiming at collecting their feedback and contributions.

- Engagement assessment: The stakeholders' feedback and contributions were validated against the defined goals of each stakeholder group, identifying new opportunities and determining additional activities.

The first step concluded in the four key groups that were further elaborated.

- Providers (Scheme owners, funders or operators): with data/information to share
- Editors: will edit and evaluate data/information before entering it into the Observatory to ensure a high quality of the published information
- Funders: those who fund schemes or require information from the Observatory to make investment decisions
- Users: those who wish to access data sources to extract information and knowledge. This group can be further divided into three categories:
 - Experts: who wish to access data sources to extract information on their own behalf
 - Analysts and the research community: who wish to access data sources to extract information on behalf of one or more of their clients/stakeholders
 - Policy makers: who have an interest in supporting and promoting the content and use of the ITS Observatory.

Based on these general targeted groups, there has been a further categorization based on the capacity of each stakeholder and its relevance with ITS development and deployment. The final categories of the groups of stakeholders that have been identified are the following:

- Private stakeholders
- Universities & Research organizations
- Public/Governmental Authorities
- Road Operators & Managers
- Public Transport Organizations and Operators
- ITS organizations
- Freight transport and logistic providers
- Media

A. Stakeholder identification and mapping

Once the stakeholders have been identified the mapping task was broken into three phases [3]:

- Analyzing: understanding stakeholder perspectives, expectations and possible contributions
- Mapping: visualizing relationships to the platform objectives as well as roles
- Prioritizing: ranking stakeholder relevance

B. Communication plan definition

The communication plan defined the tactics to be followed in order to achieve the contributions and participation expected

from each stakeholder group. The three basic levels are to inform, to communicate and to engage [3].

C. Tools definition

Dedicated tools were defined and developed for facilitating the participation of the stakeholders as well as maximizing their contribution to the ITS Observatory platform.

D. Engagement

Based on existing literature [4] there are several general categories of engagement tools that can be used based on both the specific characteristics of the groups that need to be engaged and on the specific outcomes that need to be produced. The following table includes the three main categories of engagement techniques and their respective tools that were selected for ITS Observatory.

TABLE I. ENGAGEMENT TECHNIQUES AND TOOLS

Engagement technique	Engagement tools
Information-sharing techniques	Advertising Online information processes Briefings Newsletters News – conferences Fairs or events Meetings
Consultation techniques	Discussion groups and workshops One-on-one interviews Polls Survey research
Active participation techniques	Charrettes or “inquiry by design” workshop Learning circles

III. ANALYSIS OF USER NEEDS THROUGH SURVEYS

Questionnaire surveys formed an important tool in order to assess user needs. A large-scale survey was designed and circulated to potential users of the ITS Observatory across the different stakeholder categories identified in section II. The aim was to understand exactly their needs as suppliers or users of content.

A total of 114 responses were received, 53% from the private sector and 47% from the public sector. Almost 40% were in research and consultancy, and 18% in public administration or agencies.

A key finding was that existing ITS information provision is seen as fragmented, with clear benefits to be had from a ‘one-stop-shop’ that includes complete and consolidated content about ITS deployments. This would fulfill the needs of many stakeholders, who currently search for ITS information on a daily basis using various mechanisms such as online (Google) searches, the websites of ITS organizations, trade publications, and simple word-of-mouth.

The ITS Observatory should supply a range of services. Key needs include understanding the state-of-the-art, information about technology, solutions to real-world challenges, and information or data that contributes to planning future ITS deployments.

Figure 1 illustrates the perceived importance of nine different features that could be provided by the ITS Observatory. This reflects the profile of the respondents, almost 60% of whom were in research, consultancy or public administration. Information about projects, deployments and their impact is most in demand, along with information about available technologies.

FIGURE 1. IMPORTANCE OF PROPOSED ITS OBSERVATORY FEATURES

It was emphasized by the survey respondents that the ITS Observatory would only be successful if stakeholders are encouraged to ‘buy into’ the idea of supplying content; if there is no input there can be no output, hence the ITS Observatory would not attract users and would have no viable future. The most likely content that respondents would consider publishing includes:

- Success stories relating to deployments
- Best practice and lessons learned
- General ITS project information.

Whilst the respondents acknowledge the importance of supplying content, they have a crucial message for the designers: 70% stated that the content input process must be simple and quick; otherwise supply of content would become impractical and would act as a deterrent.

In order to enrich the knowledge on the needs of users provided by the surveys, 27 one-to-one structured phone interviews were completed. These were followed up during summer 2016 with further stakeholder interviews performed face-to-face at the ITS European Congress in Glasgow. The aim of this exercise was to increase the representation of industry stakeholders, whilst also attempting to glean information that is not apparent through the survey medium.

This exercise revealed some differences in the user needs analysis compared to the survey phase relating to features of the ITS Observatory, and in particular an increase in popularity for the ‘who’s who?’ section, which in the survey had elicited a

neutral response. The following features are regarded as essential:

- Who's who?
- What is where?
- Success stories
- Standardisation
- Knowledge marketplace
- Online networking

From the content publishing perspective, the following features are identified as key:

- Product portfolio (marketing)
- What is where?
- Success stories

There is a clear drive from industry to publish products and services-related content for marketing purposes, and to extend their customer base among cities and public authorities. They will publish 'selected' content, whilst at the same time hoping to use content published by others to gain an understanding of the competition. Industry also understands that 'what is where' and success stories need to be published in order for the ITS Observatory to be useful and viable, but the success stories must come from ITS users (e.g. cities), not technology suppliers.

IV. ANALYSIS OF USER NEEDS THROUGH ITS OBSERVATORY VALIDATION

A. Stakeholder workshops

Two stakeholder workshops have taken place since the beginning of the project. The first one (WS1) was held in the very beginning of the project (June 2015) with the purpose to gather the general user expectations and requirements related to features and functionalities of the platform, and the overall usability.

The second stakeholder event (WS2), held in February 2016, aimed to test the ITS Observatory design and interface with selected stakeholders from various sectors. Thus, the potential future users were able to navigate through the Beta version of the platform, "play" with it and give feedback on how the ITS deployment information is structured and presented. The received feedback was used to improve the software platform and prepare the first operational release.

The structure of this validation workshop included the following components:

- Presentations given by project partners in charge of both user requirements and technical aspects
- Live demonstrations of the platform performed by the developers
- Individual testing including navigation through the platform
- Administration of a questionnaire reflecting the user experience.

- Breakout sessions of small working groups related to Quantitative and Qualitative assessment of user experience.

The outcomes of the workshop as presented below is the first step for both technical and user validation process that needed to be implemented in order to deliver the final version of the ITS Observatory platform. The received feedback was taken into account to improve the platform and update the specifications in order to insure an optimal compliancy of the final product with the user needs.

B. Validation questionnaire

In order to gather users' feedback, the Consortium prepared a questionnaire to be filled in by users after they tested the online platform individually. The questionnaire was used to evaluate different aspects of the platform such as data search, navigation and features.

The questionnaire was completed by a large variety of experts in ITS from different sectors and areas of activity (ANAV, EUROcities, FIA, ITS CH, ITS UK, DCTIM, Ministry of Transport, Turkey, Newcastle University, Department for Transport UK, POLIS, Shift2rail, Swedish Transport Administration and T-Systems International).

The questionnaire circulated during the workshop contained three parts:

- Part 1 Design and Content
- Part 2 ITS Domains
- Part 3 Impacts & Benefits

Six questions were asked with relation to design and content of the ITS-Observatory.

The first question aimed to evaluate the level of flexibility when searching for a particular content: "Was it easy to find what you were looking for?" From the ten participants who responded to this question, half of them have chosen "Yes", the other half have responded negatively. Those who found that the navigation was not easy enough highlighted the following reasons:

- The interface for mobile phones is not easy to navigate
- The topic "Impacts and benefits" should be more visible (e.g. a link on the home page)
- The alphabetical sorting option doesn't seem relevant
- The filtering is rather limited – there should be more categories and subcategories, and multiple selection possibilities
- No information exists on some items/ not enough data is currently available
- The results should include a short description of each project/deployment

It can be seen that some reasons given cite design and navigation issues, with modifications to the design of the home page and the filtering system key improvements to be made. Addressing the interface for mobile devices is also important. There were some comments alluding to a lack of content and

data, however, it was explained during the workshop that the content and data contained was at this stage indicative, and not complete in any category.

The second question aimed to identify the most preferred search method: “Which search method did you find easiest to use?” Searching by menu navigation was the most favoured method.

The other methods of searching were seen as limited, largely because they were still relatively under-developed and, connected to this, the lack of data and content made them less successful. It is possible that they will become more significant methods of searching as more content and data becomes available.

FIGURE 2. EASE OF VARIOUS SEARCH METHODS

Question 3 was focused on content categories: “Do you find the content categories meaningful & appropriate?”

Although this question does not relate directly to the technical validation, it is interesting to present the findings. The seven participants who were less satisfied revealed that some further work is required to ensure that the content categories are meaningful and appropriate:

- Ensure complete and representative ITS domains and sub-categories
- Attention should be paid to domain and sub-category titles, filters and keywords, to ensure widespread understanding
- The traffic management filter should be refined with additional filtering possible
- Categories should be displayed when passing the mouse above the Projects and Applications items

Question 4 was centered on identifying missing features: “Was there a feature that you were expecting to see but you didn’t find?” Eleven participants responded to this question: Yes (7), No (4). Those answering positively highlighted the following components:

- A clear distinction between research projects and deployment projects
- Impacts & Benefits should be a separate main feature
- Search entry by type of Impacts and Benefits (e.g. environmental, health, access, etc.)
- Links to other sources to be added

- A section on ITS Governance/funding opportunities/regulation/legislation
- ‘Who’s who’ with people and organizations

Question 5 was an open question aiming to identify ways for improving design and functionalities: “Please suggest ways the Observatory design & functionality should be improved (up to five suggestions). The following suggestions for improvement were received:

- Make a clear distinction between research projects and deploymentsITS
- Extend modal coverage
- Add a section tailored for start-ups
- Increase the search categories
- Enhance the map to show ITS projects, deployments and solutions, and also corridors/ highways
- Replace the map with more news
- Increase use of virtual technology e.g. video clips
- Increase interaction options e.g. through a user forum
- Add guidelines for data and content providers so data and content is standardised
- Ensure that filters work properly
- Improve the mobile interface
- Simplify pages to reduce the need for scrolling

Question 6 aimed to identify the level of flexibility and “ease of use” of the Observatory: “Is there something that you found complicated while using the Observatory? If yes, please let us know what it was”. Therefore, none of the respondents have found the navigation or any other part of their experience to be complicated.

Question 7 asked participants to suggest additions and/or modifications to the current ITS domain classification.

The final question (Q8) asked participants about labels to use when describing impacts and benefits of ITS deployment.

Based on the questionnaire combined with discussions in small working groups (breakout sessions), a valuable feedback was received and helped the developers improve the technical product (software platform), and the Consortium improve the concept of the Observatory in particular in the following areas:

- Observatory features
- User accounts
- Data administration
- Data entry processes
- Business model

C. Observatory Features

The results from the questionnaire showed the importance of defining the coverage of ITS by type (road, rail, maritime, etc.) and the vocabulary used to define the ITS domains. A proposal for ITS categorization included levels of categories such as vehicles, infrastructure, services, and then relevant sub-categories for each of the main components. The questionnaire

results showed also a difference in the expectations from public and private sector sides.

D. User accounts

The survey showed concerns regarding the user accounts in particular when professionals registered as content providers on the Observatory change the organization.

E. Data administration

The main concerns raised by most of the participants were related to data quality and ownership, storage and security. Therefore it was highlighted that the Consortium should decide if the Observatory could be “sold” after the project ends. Links to other collaborative platforms should be provided in order to strengthen the interoperability among platforms. Finally retrieving data should be available in a way of using and searching for information.

F. Data entry processes

Industry delegates demonstrated reluctance to publish information about implemented solutions as a success story as they need permission from their customers. Therefore, a legal disclaimer should be defined precisely, clearly indicating that the Observatory operator is not responsible whether the contributor has the right to publish any information related especially to projects or not.

It is expected that different users will enter content for different reasons. As regards data entry, training should not be needed and the process has to be quick and simple.

G. Business model

Initial action for the development of the business plan is the identification of the market demand and the categorisation of the prospective users. An option for providing better quality of information could be to introduce a payment rate. An entry fee should be possible considering that the Observatory could act as an indirect way for the industry to advertise their business. For public authorities there should be an exemption from payment obligations.

A proposal suggests that the Observatory should highlight the SMEs and their activities/products and/or activities-information for start-ups. A model relevant to yellow pages concept could also be adjusted and used in the case of the Observatory. Also the direct involvement of national ITS associations could promote the Observatory to a wider audience.

V. CONCLUSIONS

The survey and interview analysis has reinforced existing knowledge obtained from the formative project workshops of what stakeholders want from the ITS Observatory, and how they will use it. The differences in priority requirements

between public authorities and the private sector have also been revealed. Although a one-stop-shop ITS Observatory would defragment the search process, making it quicker and hopefully more complete, the long term sustainability and viability is dependent on the quality and quantity of the content inputs. The content input process, then, is fundamental to the ITS Observatory becoming a success story in itself, with the following specific considerations:

- Quick simple content input process
- Completeness of content
- Maintenance and updating of content beyond the end of the project
- Design that is simple and accessible to all

These are issues that must be addressed by the designers and managers of the ITS Observatory within and beyond the project's lifespan (and defined in the Operational Plan, and the Deployment Plan) in order to create a viable and sustainable entity in the future.

The results from the validation workshop with users constituted the first input for the validation of the platform mainly in respect to the user needs and requirements. The combination of questionnaire and workshop discussions helped engage a lively discussion and obtain concrete suggestions on how to improve the user experience with the platform and how to present the content in a more easy-friendly way. The variety of ITS domains suggested by the participants at the workshop showed the complexity of the ITS sector in general and the difficulty to establish common terms and labels for ITS domains and solutions.

After receiving and analyzing the received feedback, an updated version of the platform was developed (the Beta version) in which the ITS classification and the data specifications were modified in order to meet user needs.

Acknowledgment

The current study was conducted in the framework of “ITS Observatory project funded by Horizon 2020 European Funding Programme.

References

- [1] Mitsakis, Evangelos, et al. "Deployment of Intelligent Transportation Systems in South East Europe: Current Status and Future Prospects." *Transportation Research Record: Journal of the Transportation Research Board* 2489 (2015): 39-48.
- [2] Accountability, 2008. AA1000 Stakeholder Engagement Standard (AA1000SES)
- [3] Jonhatan Morris 2012, BSR. Back to Basics: How to Make Stakeholder Engagement Meaningful for Your Company.
- [4] <http://stakeholdermap.com/stakeholder-engagement.htm>