USE-ME.GOV
(USability-drivEn open platform for MobilE GOVernment)

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Abstract: *Project USE-ME.GOV will provide an open service platform that can be shared by networked authorities and institutions (e.g. on a regional scale) in terms of technical infrastructure, information (content) as well as a framework for commercial exploitation. This contribution of the project is seen as a promising approach to harmonise the quality of public services and to overcome related Divide phenomena. Moreover, platform sharing explored on the basis of attractive business models would also provide the conditions for cost-efficient mobile services namely in geographical areas with low internet penetration. This paper describes the current state of USE-ME.GOV concerning user requirements, design and usability, and implementation of the project.*

Keywords: eGovernment, mGovernment, mobile services, mServices, open platform, usability, sharing, openness, interoperability, scalability, business models

1. Introduction and objectives

IST initiatives for improving services to the citizen and businesses are prevailingly promoted and implemented by individual authorities and organisations. Nowadays even smaller towns operate their own web-site with access to general public information, whereas larger cities and institutions use to offer a wider range of more sophisticated electronic (web-based) services.

However, the richness and quality of these services vary significantly. In particular small authorities, e.g. in rural areas, have limited financial, technical and human resources in order to implement and deploy electronic services with the same quality as large organisations (Leenes, Svensson, 2002). This aspect becomes even more critical for the deployment of mobile services because of a higher complexity of service implementation, required organisational changes as well as higher costs for commercial exploitation due to complexity of value chain.

Authorities are usually organised in departments each with own responsibilities, tasks, structure and customers. Unfortunately, IT infrastructure and equipment as well as corresponding technical background knowledge differ from door to door. Mobile operators or portals are searching for content to

promote their new mobile technologies and approach public organisations to deliver services on Internet and wireless networks. Once contracted, one department connects to the mobile operator in charge and "somebody" implements a proprietary bridge to one specific operator interface. This bridge can normally not be reused for other applications or other mobile operators.

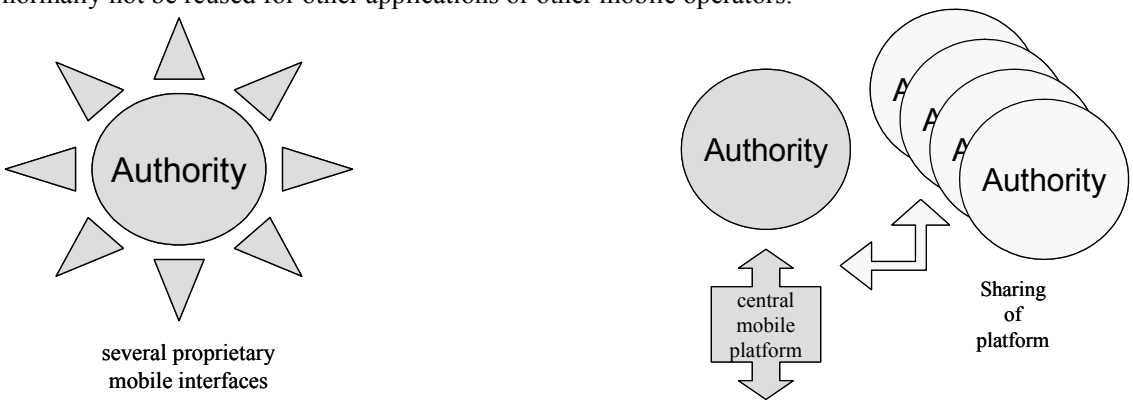

Figure 1: Mobile interfaces to and from authorities before (left) and after (right) USE-ME.GOV

Authorities are now actively searching for mobile solutions to implement regulations and recommendations from state, national and European bodies calling for eGovernment, eGovernance and of course mGovernment. But due to often missing technical background, monetary shortcuts, legal restrictions on innovative partnerships and business plans, and less experience about mobile market interdependencies, they are hesitating to invest time and money in solitaire solutions with a high degree of proprietness and accordingly major investments.

The deployment of an open service platform that can be shared by networked authorities and institutions (e.g. on a regional scale) in terms of technical resources as well as commercial exploitation will harmonise the quality of public services and overcome related *Divide* phenomena. On the other hand, resource sharing explored on the basis of attractive business models would also provide the conditions for cost-efficient mGovernment services namely in geographical areas with low internet penetration.
Hence, project USE-ME.GOV's key objective is to support authorities entering the mobile market with an open source platform allowing

- to share common modules with other departments or other authorities (for example subscription, alerting components),
- to secure development and operation by open source transparency,
- to attract further mobile operator independent of respective interfaces, and
- to estimate efforts, outcome and benefits in advance.

This paper gives an overview about project USE-ME.GOV, its current state and findings including services planned, obstacles experienced and technological design and implementation in work. An outlook finalises this paper as conclusion.

2. Project USE-ME.GOV

The USE-ME.GOV project is funded under the 6thFP, IST – 1, Networked Businesses and Governments (2.3.1.9). The project started in January 2004 and will terminate in early 2006. The main goal of the project is to support and encourage public administrations to provide new e-government services at any time and anywhere through the use of mobile communications technologies employing an innovative next-generation open service platform for mobile users. This platform allows to share technical infrastructure, information as well as a framework for commercial exploitation by networked authorities and institutions (e.g. on a regional scale).The open service platform has been designed to comply with high-level requirements that impact positively on the overall cost of deployment, such as sharing of content, independence from commercial off-the-shelf software, interoperability and scalability.

The members of the USE-ME.GOV Consortium are 3 local governments, one regional government, two universities, a mobile operator and four technological partners from a total of 6 countries. The four pilot mobile services which are to be put in place to test the platform are the following:

- News Broadcast Service – This is a subscription based individualized news service being put in place in Bolonia, Italy.
- Mobile Student – This service gives students and parents access to individual and collective information such as class times, marks and other information. Also included is a module which allows parents to validate marks. It is being implemented in Extremadura, Spain.
- Healthcare – In this service the citizens of Gdynia, Poland will have access to different types of health related information such as healthcare prevention programmes and initiatives for tar-get groups such as young families with babies and elderly people. The service also offers to the user the opportunity to request and make appointments at healthcare centre according to his needs (medical speciality) and preferences (data, time).
- Citizen Complaints - This service allows citizens to register complaints and, through the use of context information, minimizes the requirements for data input. It will be located in the town of Vila Nova de Cerveira, Portugal.

The project is currently (mid-April, 2005) in the middle of the development stage. The main components of the core platform such as communication, terminal and user modules are ready and integration is well under way. It is expected that the development of the pilot services will be completed in August and the operation of these services will begin in early autumn.

3. Needs and Benefits for Public Mobile Services

The project team performed a detailed analysis of the particular needs and expectations from each of the authorities involved in the project. It was found that they follow a variety of operational, economical as well as political and IST strategic goals. The following USE-ME.GOV services have been evaluated:

- Mobile services are seen as new and/or complementary dissemination channel and means of access to public information. Public information is of various nature:
  - general public information
  - time-critical information (emergencies, traffic)
  - notifications according to user specific interests

  Key Benefits
  - Dissemination of information to a larger number of people (mobile access) at a very short time
  - eEnlarged accessibility, transparency, citizen satisfaction
  - Improved image of town, city …
- Mobile services as communication channel between the authority and the citizen (as well as businesses). The most evident application of this concept relates to the context of particular cases and processes (e.g. requests for certificates) where some part of the process and corresponding (notifications on the status of a process) could be done through mobile means.

  Key Benefits
  - Reduction of average service processing time, mainly for correspondence concerning simple notifications
  - Ubiquitous and instant contact
  - Reduction of costs
  - More time freed and spent on particular cases
  - Satisfaction of citizen and private users
- Mobile services can particularly stimulate the participation of the citizen in local community matters and be applied as channel for the submission of complaints, suggestions etc., accessible to the public. This kind of service also encompasses the communication between the authority and the citizen during the follow-up of the complaint/suggestion.

  Key Benefits
  - eEarly detection of problems reported by the citizens
  - Enlarged accessibility

- Transparency
- Increased participation of citizen in community matters
- Citizen satisfaction
- Ubiquitous and instant contact

- Within the context of general public information services, mobile services can also be used as vehicle for promotion at local (cultural, fairs) events. The promotional effect would be particularly useful for local businesses with limited financial and organisational capabilities to otherwise announce their presence at a timely and geographically limited event such as a local fair.

  Key Benefits
  - Dissemination of information to a larger number of people (mobile access) at a very short time
  - Reduction of costs
  - Contribution to sustainability
  - Promotional support to local businesses
  - Improved image of city, town, region, …

From the analysis it was concluded that authorities have a clear understanding of how the targeted mobile services fit into their individual IST strategy, and have also shaped ideas of benefits that these partners attempt to obtain from the services. On the other hand, lack of experience as well as missing (defined, tested, proven) business models make it difficult to quantify these benefits and translate them into measurable operational and economical gains.

Other factors and adoption barriers contribute to this uncertainty. Even though the potential for increased service efficiency and productivity seems to be evident, mobile service provision cannot stay disconnected from underlying work-flows for service provision and require a certain level of reorganisation. The bottlenecks of current work-flows are known, however, the impact of introducing particular mobile services can be quite significant and complex, whereas organisational resistance to change and the need for modifications to established norms and administrative procedures must also be considered.

3.1. Networked Administrations – closing the Divide between large and small Administrations

In very close relationship to the first objective, we believe that the concept of networked administrations deserves a high level of attention. It should be considered that the digital divide gap between large public administrations (e.g. national organisations, big cities) and small, local authorities is far from being closed, namely with respect to truly interactive services as opposed to public information dissemination. In several countries, national initiatives (governmental institutions) in particular have created successful electronic (high volume) services such as tax declarations, car licence registrations, electronic payment of services etc. This evolution is still not matched at the local level, and taking into account that citizens have to treat the vast majority of their personal cases and processes with local administrations, the need for an enlarged access to electronic public services is still significant (European Commission, 2000; Leenes, Svensson, 2002).

Again, availability of information technology is by itself not the key problem, but limited resources and also skills of smaller municipalities. We hence believe that networking of administrations is the most promising approach to overcoming the main non-technological barriers. Whilst from the perspective of policy, small authorities could be considered by particular measures (similar to the equivalent support for SME's in the 6.FP); in addition to the required organisational innovation (see above), key objectives for networked government should be:

- integrated multi-municipal and inter-organisational (networked) information systems
- networked solutions allowing for increased economical sustainability for joint, multi-channel service delivery, exploring the concepts of sharing of resources (hardware, software, services)
- (demonstration of) successful combination and integration of all interoperability dimensions - application + semantic + organisational – in the context of networked government.

4. Usability-driven Approach

The concept of sharing between networked organisations drives in turn the needs for particular technological capabilities of the platform itself, explaining the specific R&D objectives that the consortium has set out for this project. For the design of the open service platform and pilot services, the project team follows a usability-driven approach, as also indicated by the name of the project. The concept of usability is many-fold and encompasses the following fields of research and application:

- *Enlarged access to public information services*
  An important goal of the project is to ensure broad access by a significant part of the population. Through the use of commonly accepted standards the platform provides openness and interoperability with regard to the interconnection with different networks, the integration of external content providers and public authorities providing their services.

- *Intuitive and user-friendly mobile interfaces*
  Services are designed taking into account heterogeneous user characteristics, addressing the common needs of the citizens with different educational or even cultural background, age and interests, allowing for easy access to and search of information considering location, context and user interests.

- *Deployment of services*
  The concept of usability also implies that mobile services must be easy to deploy for the authorities, not depending on expensive software-hardware products or demanding technological skills for their configuration, maintenance and continuous update of service content. Most of what are usually considered to be the most difficult questions in developing mobile services such as communications, interfaces with the operators, etc. have been encapsulated in such a way that the persons responsible for the deployment are not required to be experts in communications and/or protocols.

- *Economical sustainability*
  The participation in the platform is thought to be open to all interested providers of public mobile information services including small authorities and organisations that have limited financial capabilities to deploy mobile services on an individual basis. The framework for exploitation takes into account the diverse needs and interests of public and private providers of services and information.

Mobile applications design faces many challenges, one of them being the achievement of intuitive and efficient user interfaces for very heterogeneous use conditions. The project results obtained so far have shown that such properties rely on four major requirements:

- A comprehensive user requirements analysis, which is critical in order to create useful and efficient services that fit user characteristics, needs and conditions of use.
- An iterative and multi-disciplinary design process: design iterations are basically required since user requirements cannot be fully established at the beginning; making a service more concrete, through scenarios, mock-ups and prototypes achievement, is necessary to enrich the initial user requirement analysis and find the best solutions. The user participation to the design process, in particular through usability test, is also required since knowledge in the field of mobile user interfaces is still incomplete to correctly predict users' behaviour and opinions.
- Simplicity of the service, a major requirement to create easy-to-understand and easy-to-use services on mobile devices. This requirement is mainly due to three factors that should be applied to many citizen mobile services: (1) infrequent use, which means that users always need to be appropriately guided through the service, (2) input and output constraints (e.g., reduced screen size, few keys), (3) mobile use conditions, which are typically less convenient that at the office or home and far more distractive.

- Contextual adaptability, made possible by multimodal interfaces and context-awareness capabilities. Such a requirement accounts for the users' need to adapt their use to various devices and various contexts and improve user interaction (e.g. alleviating text input tasks).

5. Platform Design

The main factor behind the architectural partitioning was to design such architecture that it would be feasible to provide both stable and extensible application systems. Stable application system should include all the functionalities that are indispensable for all other system's parts and therefore, constitute a core system's functionalities. Extensible parts of the system should provide for all those functionalities that can be joined up, shared and utilized among all other participating entities (Maciaszek, 2005; Larman, 2005).

On the other hand, the project team approached the issues of openness and interoperability of the proposed solution with an exhaustive attention. For the purposes of this introduction the distinction of technical and usability aspect of these concepts shall be presented. Technical aspect imposes the platform to utilize and accept common standards of the most influential standardization bodies, notably W3C organization. Usability aspect resulted in an architectural possibility of other defined entities to coexist with USE-ME.GOV platform, such that the content can be shared, added-services provided or any other defined functionality provided.

The architectural requirement for the division of application systems and the project's technical goal for open and interoperable platform were able to be fulfilled only by one architectural framework.. Service Oriented Architecture, most notably its latest instance of Web Services Architecture (WSA) proved to be a huge success among research bodies.

The USE-ME.GOV system is designed to allow the delivery of content and e-services to users who use variety of mobile devices with different capabilities and connecting by various communication channels. These services constitute an added value (from now on Added-value services, **AVS**) and are not integral part of the **USE-ME.GOV platform**.

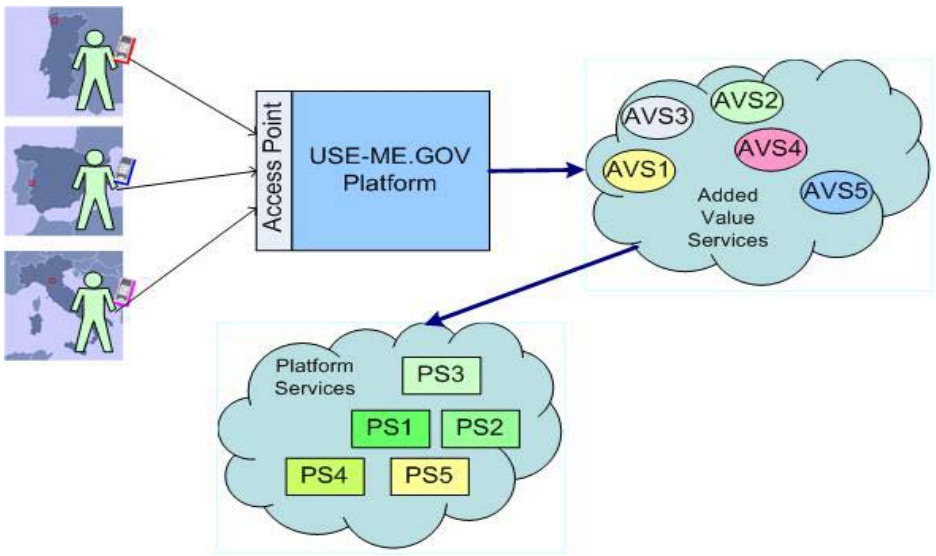

Figure 2 - USE-ME.GOV System General Architecture

AVS' are intended to be delivered by third parties and may be created using virtually any technology and deployed on any machine as long as its functionality is accessible via designed interface. For interoperability issues open and commonly accepted technologies are used. AVSs use Web Services

(conformance to WS-I Basic Profile) for remote procedure calls and electronic documents interchange and use WML and xHTML over HTTP for content delivery.

As part of the USE-ME.GOV project following pilot AVS' are provisioned:

- *Healthcare service,*
- *Mobile student service,*
- *Report of complaint service,*
- *City information service.*

The user is not allowed to invoke AVSs' functionality directly. The USE-ME.GOV platform takes care of finding appropriate service, dispatching request from user to AVS and forwarding responses to users and contacting users on behalf of services.

The USE-ME.GOV platform consists of two separate application systems that are deployed on J2EE servlet container i.e. **Core Platform** and **Service Repository**. Core Platform serves as a single point of contact for users. The user connects to the platform using an access point, which allow for communication using defined communication channel. Service Repository is designed to be extensible, thus new access points may be introduced. Standard communication channels include:

- Interactive access point – xHTML over HTTP
- Non-interactive access point – SMS
- Non-interactive access point – MMS

Core Platform is also responsible for management of users and terminals. The former consists of maintaining the user database including user profiles and subscription data to AVSs. The later consists of repository of user terminal data (like mobile operators, telephone numbers etc.) and user terminal capabilities (derived from UAProf).

The user does not need to be aware of the AVSs available or their location. Core Platform is responsible for forwarding messages to proper location. This task is achieved with the help of Service Repository.

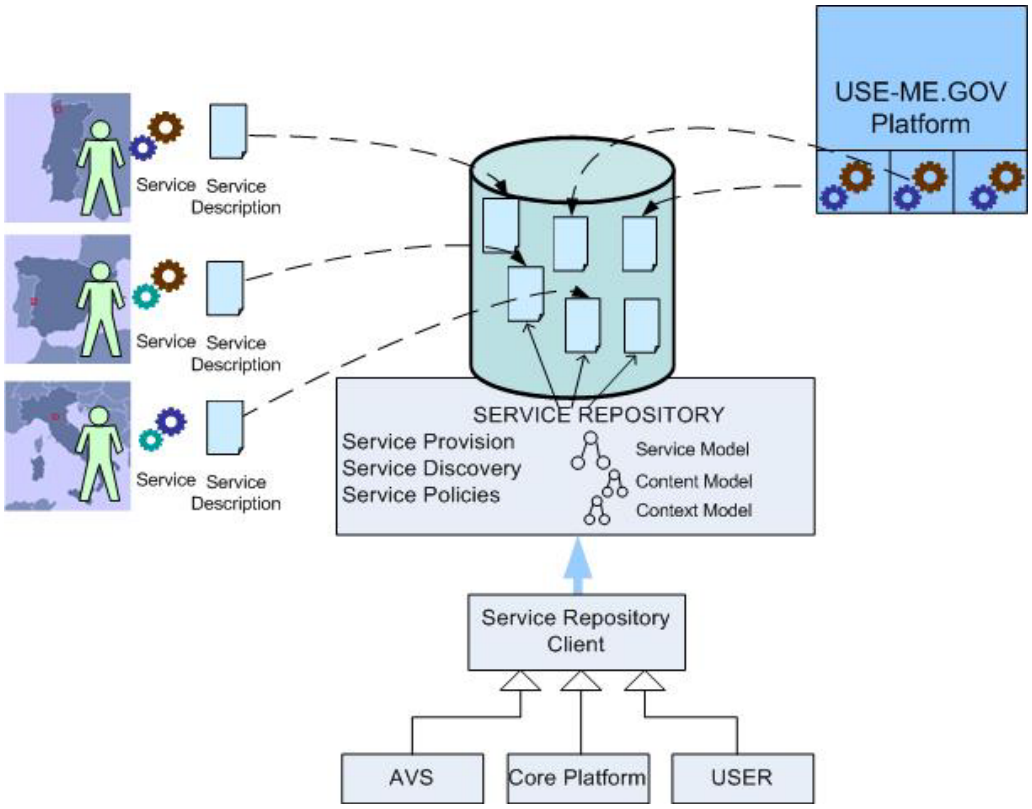

Figure 3 - Service Repository General Architecture

Service Repository serves as a central registry of available services. Every service which wants to be discovered must register its description within the repository. The description (description language is defined by Meta-Protocol of Service Types) contains functional and non-functional features of service encoded in semantically rich format. These descriptions allows for easy finding of relevant services as well as their automated execution.

USE-ME.GOV system introduces also a notion of **Platform Services**. Platform Services are services provided either by platform operator or third party which extends functionality of the USE-ME.GOV platform. Their functionalities must also be exposed as a Web Service and their also must be registered within repository. They differ from AVSs in a way that there are not directly accessible by users. Sample Platform Services included in the platform installation are:

- Context Aggregation Service
- Context Provision Service/Localization Service
- Content Aggregation Service
- Content Provision Service

6. Conclusion & Outlook

USE-ME.GOV is about networked government and has the objective to provide a solution that enables ALL public organisations and authorities to integrate mobile services into their strategy for multi-channel service delivery, taking advantage of the intrinsic benefits of resources sharing whilst ensuring sustainability of service provision.

The main area for growth and the main challenge for USE-ME.GOV in the short term is the extension of its use to areas of public service that go beyond "government to citizen". This can be divided principally into two ideas:

- The first is to take advantage of the platform for internal services of the authorities. The platform would allow faster and cheaper development of wireless applications for PDA's or smartphones for

public workers who work outside their offices (eg. social workers or health inspectors). The other area of growth would be in quasi-public services where the organization may not be strictly public but is offering a public service - for example in transportation or healthcare.
- Secondly, for USE-ME.GOV in particular and mobility in general, the main challenge and opportunity for the future is in the area of convergence between IT, telecommunications and media content. USE-ME.GOV can serve as the basis for the mobile leg of real multi-channel services. For example, the use of video streaming would allow the citizen to see a meeting in the town hall on his mobile phone (or his TV or his PC) at any time and place. Another example would be the mobile phone as "contactless smartcard" (but with far greater radius of action and greater convenience for the citizen) for automatic payments, access control, identification, etc.

The following factors have been identified as crucial for the prospect of success of USE-ME.GOV services:

Technological Factors
- In dependence of the particular characteristics of the service, the integration of content from the authority side requires structural changes to organisation, the administrative work process and/or IT infra-structure. For example, the automatic delivery of personalised notifications (e.g. confirmation that a certificate is ready) impacts quite significantly on the usually implemented workflow.
- The integration of USE-ME.GOV services into a multi-channel service architecture.
- Services rich in interactivity require fairly advanced mobile phones. The co-existence of phones from several technological generations on the market, and related digital-divide phenomena, could still limit or at least retard the success of deployment.

Social Factors
- Digital-divide phenomena, e.g. by default diverging levels of user interest and acceptance for mobile services depending on social background, age and educational level.

Economic Factors
- Financial investment by the municipality is still required for implementation and deployment.

Regulatory Factors
- Public administrations may not be allowed to provide certain services that are also provided by private companies. As the integration of information provided by the administration and other content of public interest is concerned, regulatory barriers could reduce the potential for public-private partnerships.

Political Factors
- USE-ME.GOV builds on the concepts of networking and sharing and there is no doubt that the benefits of platform exploitation also depend on the degree to which this is achieved. Political engagement, for example with respect to the organisation of regional initiatives (regional programme, municipal association), is therefore required.

USE-ME.GOV will elaborate these factors during the further work of the project.

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