Generic Services for Cross Domain Use in e-Government

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Abstract. The economic crisis was a catalyst in the evolution of the cloud computing and the rationalization of the IT systems that offer e-Government services. The reusability of software and services is a mandatory requirement in the new systems that are being designed and developed. Despite of the differences in use cases that different domains such as e-Health, e-Procurement, e-Business, e-Justice, e-Learning utilize, the core services that are necessary can be summarized in eID, e-signature, e-delivery, e-documents and semantics under a secure and trusted environment. This paper aims to present the main actions in the European Union such as the Connecting Europe Facility program, the principles of the next program after the Interoperable Solutions for Public Administration and large scale pilots such as STORK2 and E-SENS. The sustainability of all these solutions is a challenging issue that should be tackled.

Keywords: e-gov services · e-Documents · Electronic e-Identification · e-Signatures · Privacy · Trust · Authentication · e-Delivery · Large scale pilot projects · LSPs · PEPPOL · SPOCS · eCODEX · STORK · e-SENS · CEF · ISA

1 Introduction

During the last decade a significant boost on E-Government services was reported in Europe mainly based on European initiatives and action plans (e.g. i2010 eGovernment Action Plan [1], eGovernment Action Plan 2011–2015 [2]) and on the structural funds (e.g. European Social Fund [3], European Regional Development Fund [4]).

The public online e-governments services focused among others on [5]:

- **User Empowerment:** by supporting citizen digital inclusion, re-use of public sector information and online collaboration,
- **Increasing the efficiency and effectiveness of public administration** by facilitating the reduction of administrative burdens to businesses and the mobility through Pan-European online cross border services

The IT systems that supported these e-Government services were developed under the supervision of specific public administration bodies that according to their responsibilities identified different operational needs, different business processes, different

requirements, different specifications, and consequently different technical solutions and implementations.

Each of these Domain Specific IT systems has to be sustainable; therefore the operational cost and cost related to the evolvement of the IT systems should be included in the budget of the public bodies that were responsible for the operation of the IT systems. The sustainability discussions raised issues related on the return on investment and the cost sharing among different public bodies that have similar needs.

Interoperability, reusability and service oriented approach revealed as the main direction for cost reduction [6]. Service oriented architecture has been adopted by the conceptual model for public service delivery in the European Interoperability framework [7]. The economic crisis in Europe significantly accelerated the results of these discussions and acted as a driving force that facilitated the launching of a rationalization process of the existing IT systems. Moreover the new Connecting Europe Facility Program [8] that is under the final approval process by the European Parliament aims to digital service infrastructure i.e. an infrastructure that connects public administration across Europe, facilitates the cross border e-government service delivery, enhances the access to the public sector information using multilingual services in a secure and safe environment.

Digital Services Infrastructure will offer services for cross domain use. In the following paragraphs of this paper the potential generic services will be reported. Additionally, the goals of the Large Scale Pilot projects of STORK2.0 [9] and E-SENS [10] towards this direction will be presented and the potential future work in this aspect will be proposed.

The paper is organized as follows. Section 2 presents the most significant Domain Use Cases supported by e-Government Services. Section 3 describes the Generic Services from cross domain use and further work on this field. Finally, the paper ends with some conclusions.

2 Significant Domain Use Cases Supported by e-Government Services

Currently public administration is handling a lot of different business domains such as e-Procurement, e-Business, e-Health, e-Justice, e-Social Security and others. Moreover the collaboration among different public authorities at European level is inevitable in order to implement the European policies on the specific domains. Different use cases must be supported by the IT systems. Some important needs and use cases at European level that have been identified by large scale pilot projects that have been funded under the Policy Support Programme of the Competitive and Innovation Framework Programme - CIP/PSP (decision 1639/2006/EC on the establishment of an Competitiveness and Innovation Framework Programme (2007 to 2013) or the and the European Commission Services [21]. The next paragraphs highlight some of these important use cases.

2.1   e-Business Domain

The work on the business domain at European level was initially facilitated by the Services Directive in the internal market (directive 2006/123/EC) that aimed to provide the ability to a business person to start offering services in another Member State of the European Union or the European Economic Area by fulfilling all the administrative procedures and formalities using electronic means, through a Single Point of Contact. In 2008 a large scale pilot project was launched in order to facilitate the implementation of the Services Directive i.e. Simple Procedures Online for Cross-border Services (SPOCS) [11]. The use case that was mainly supported was the activity registration of a business person that required electronic documents signed by the business person, evidence during the electronic transactions among the business person and the Point of Single Contact, the reuse of electronic documents from a source of authentic documents and semantic interpretation of the required supporting documents that the business person should submit in order to get the appropriate licence for offering services. The SPOCS project ended on 2012 and the solutions that were implemented are available through a starter kit that was implemented to help the interested person to reuse the solutions (http://www.eu-spocs-starterkit.eu/).

The work at European level on the business domain is being further developed and now is focusing on the interoperability of Business Registries that according to the Directive 2012/17/EU for the interconnection of the central, commercial and companies' registries will enhance the services that will be offered by the European Justice Portal [13]. Therefore, the large scale pilot project e-CODEX [12] that was launched for handling use cases related to e-justice on 2010 is examining the support of European use cases related to the transfer of the seat of a company that requires interoperability among business registries, and evidence for the transactions. The solutions that are being implemented by e-CODEX are expected to be available to the public during 2015.

2.2   e-Procurement Domain

The discussion for public procurement at European level has started many years ago. An important milestone in this discussion was the directive 2004/18/EC on the coordination of procedures for the award of public works contracts, public supply contracts and public service contracts. A lot of remarkable results on public procurement have been achieved the recent years such as the Tenders Electronic Daily, for browsing the public procurements by country, region, business sector [14], the e-CERTIS [15] that has a mapping for different certificates and attestations among European Economic The period from 2008 until 2012 the large scale pilot project Pan-European Public Procurement on Line (PEPPOL) [16], was implemented contributing to solutions supporting use cases for:

- creating the e-Attestation (Virtual Company Dossier - VCD) i.e. the set of the supporting documents and information that must submitted in each procurement by the companies that are interested to participate,

- creating the catalogue of goods and services that are requested by the contracting authorities and are offered by the suppliers,
- submitting e-Orders to the suppliers and handling the lifecycle of the order until a receipt and / or an e-Invoice is received.

The solution provided by the PEPPOL project supported the signature validation whenever it was necessary, the creation and transport of the appropriate evidence for the transactions among the contracting authority and the suppliers, the semantic mapping of the certificates and attestations for creation of the VCD.

Currently the results from the PEPPOL project are maintained by the ISA programme [17]. In the Joinup platform (https://joinup.ec.europa.eu/) one can find the latest advances related to the PEPPOL software. Moreover, the nonprofit association OpenPEPPOL [16] that was established in 2012 will be responsible for the maintenance of PEPPOL specification and building blocks.

2.3   e-Health Domain

The discussion on Social Security Systems and e-Health at European level was a long term procedure that has reached a minimum convergence in 2011 with the directive 2011/24/EU for the Patients' Rights in cross border health care that respecting the national competencies in organising and delivering healthcare, provides rules for facilitating the cross border health care provision [18]. Additionally, in the e-health domain the data privacy is considered as a top priority issue since the data that are being exchanged are regarded in most of the cases as sensitive personal data (directive 1995/46/EC). In 2008 was launched the large scale pilot project, Smart Open Services for European Patients (epSOS) [19], especially for e-Health use cases. This project is still in implementation and the final results are expected to be delivered by the end of the first semester of 2014. The use cases that are supported are mainly focusing on the transfer of the Patient summary (e.g. the general information about a patient, the most important clinical data such as allergies, the current medication, etc.) and the e-prescription. One more important use case that is being discussed in the context of the co-ordination of the Social Security Systems is the e-Confirmation i.e. the process that verifies the citizens' rights and entitlements regarding cross border health care provision and in particular the reimbursement of health care provided in another Member state. The Electronic Exchange of Social Security Information project (EESSI) [20] aims to elaborate this type of use cases. The time plan for EESSI has been extended up to 2018.

2.4   e-Justice Domain

The principles for cross border judicial co-operation at European level derive from the Treaty of Amsterdam in 1999 and Treaty of Lisbon in 2007. The specific actions for supporting the objective of the treaties using information technology are described in the European e-Justice Action Plan for 2009-2013 (2009/C 75/01). As mentioned above the large scale pilot project that support use cases for e-Justice is eCODEX [12]. The main use cases that have been analysed in eCODEX are:

- The European Payment Order that is based on Council Regulation 1896/2006,
- The Small Claims procedure that is based on Council Regulation 861/2007,
- The Mutual Recognition of Financial Penalties that is based on the Council Framework Decision 2005/214/JHA and the Directive 2011/82/EU,
- The Secure cross-border exchange of sensitive judicial data that is based on Council Decision 2005/671/JHA,
- The European Arrest Warrant that is based on the Council Framework Decision 2002/584/JHA.

The solutions that are being implemented by e-CODEX are expected to be available to the public during 2015.

2.5   Collaboration at European Level

Apart from the specific domains that were described in the previous paragraphs there is a also a plethora of systems that aim to exchange reliable information between European Union authorities and Member States [21]. These special systems are focusing on handling alerts, requesting assistance, collecting data, monitoring and reporting. Moreover these systems facilitate collaboration among stakeholders and/or provide access to specific communities. The architecture of these systems can be either centralized or decentralized. Semantic interpretation and semantic interoperability of the exchanged information is crucial in use cases.

3   Generic Services from Cross Domain Use - Future Work

The analysis of the different use cases from the different domains revealed common functionalities that should be supported regardless of the domain that were used. The work in the different domains in many cases tackled similar challenges, following different approaches and technical solutions. The building blocks that were developed to support the technical solutions in each domain must be separately maintained and sustained increasing the relative cost. Considering the rationalization of the existing systems and solutions and the creation of digital service infrastructures one can easily draw the conclusion that the building blocks that support similar functions must converge to one technical solution.

The eSENS project [10] was launched in 2012 for this purpose i.e. to identify the common building blocks and be converged to one solution that can meet the requirements of the different domains. eSENS aims either to reuse existing solutions or modify them in order to make them suitable for cross domain use.

Furthermore, eSENS will assess the existing solutions and standards using a methodology that will be based on the Common Assessment method proposed by the ISA programme [22]. The solutions-building blocks that will pass successfully this process and be reused in eSENS, will be eligible for further evolvement in the Connecting Europe Facility programme and the basis for the creation of digital service infrastructures.

The detailed analysis of the needs and the above mentioned use cases, in the context of eSENS project, has identified some common generic building blocks and services that could be potentially used at all domains. The most important of them are the following:

3.1 Authentication

Authentication is a generic service that can confirm the identity of a user. This generic service in some cases should also confirm the role or the mandate that a user has. For instance in the case of e-Business and e-Procurement only a user that is legal representative of a company or has the appropriate mandate can act on behalf of a company. Currently the different IT systems can authenticate the users using either the national eID or using special registration procedures. The user registration and management is special function that increases the operational cost of an IT system and consequently the administrative burden to the users. Interoperable eID solutions at European level have been provided by the Large Scale Pilot project STORK1 and STORK2 [9]. The scope of STORK 1 and STORK 2 solutions is IT systems that provide e-government services to be able to identify users based on existing information from identity providers at National level and special registries that are responsible for the provision roles or mandates (delegation of powers). The results of the STORK1 project are available on the joinup platform and the solution is currently being maintained by the ISA programme [25].

3.2 E-Signature

The creation and verification of a digital signature in an electronic document is a horizontal issue that is necessary for an action to have legal effect at e-government services. For Instance in e-Health a doctor should be responsible for the e-prescription, in e- Justice a European Arrest Warrant should be signed by the responsible Judge, in e procurement the business person should be responsible for bid that he/she submits. A lot of solutions for digital signature exist across Europe but most of them use a proprietary format that does not allow the verification from a different system. The solution that has been provided by the European Commission through DG MARKT (Service Directive DSS tool [23] that supports XAdES, PAdES, CAdES standards and is available in the Joinup platform) is compliant to the recent European council decisions for digital signature format. Moreover, in the context of STORK1 project a signature creation solution has been provided (XAdES, PAdES, CAdES). A verification tool has also been developed in the context of PEPPOL (XKMS, Trust Lists) project for e-procurement purposes. In addition, in the context of e-CODEX [12] project the trust library was extended.

3.3 E-Delivery

A secure channel for the electronic exchange of information and exchange of electronic documents is mandatory in order to be able to have the appropriate evidence and proofs

that a transaction has been done, especially when the communication has a legal binding with the rights of the Citizens and the Business. The time that a transaction was performed, the systems and users that were involved, the integrity of the content that was exchanged are crucial evidences in e-government services. Solutions at European level for e-delivery infrastructure were proposed by the following Large Scale Pilot Projects: (a) SPOCS [11] implementing the ETSI REM evidence and REM SOAP binding profile, specification for e-Business, (b) PEPPOL [16] implementing specification for Service metadata location and publishing, Secure Asynchronous Reliable Transport, Light weight Message exchange (ebMS3.0), (c) E-Codex [12] trying to converge SPOCS and PEPPOL e-delivery solutions using ebMS3.0 specification, (d) EPSOS [19] and SPOCS [11] have also introduced for e-Health and e-Business a repository (e-Safe) based document exchange i.e. some document initially are stored on a repository and at a later stage are retrieved in the context a specific process.

3.4   Trusted Circle

Trust is a crucial horizontal issue and architecture building block in e-government services. The systems that will be involved in a transaction must fulfil specific security requirements considering mainly data privacy and other provisions of the legal framework e.g. intellectual property rights, and potential threads such as denial of service attack, man in the middle etc. Usually in these solutions one or more national gateways are responsible to register the national systems in the trusted network. These systems are included in a Trust list (ETSI specification for TSL [24] for digital signatures), that has been extended for several purposes by the large scale pilots. SPOCS has introduced an extension to include e-Delivery services, E-Safe Services and service directories for the discovery of e-government services. PEPPOL has used trusts lists for the signature verification services. STORK1 has proposed similar list as gateways for eID services combined with an indicator for the quality of the information (Quality Assurance Level). Finally, also EPSOS has used Trusted lists for National Contact Points.

3.5   Semantics and e-Documents

The interpretation of the information is critical in all e-Government services especially when interoperable services are utilized. Business process must be aligned among different systems that support them. This requirement is more demanding when cross border services are about to be offered. Semantic can be domain independent provided that specific taxonomies, classifications and ontologies will be defined considering generic standards and reusing existing entities. Structured reusable content profiles, schemas, for processes, case folders and documents must be defined. Finally, when comes to cross border services the mapping among services in different Member Sates must be done. Translation service is one of the key generic services that can be used considering semantic mapping in conjunction with heuristic algorithms.

4   Conclusions

The different domains have common functionalities that can be supported by common solutions and building blocks. However, the legal and business aspects at a National and Cross border level are in some cases still a challenge.

So far, e-SENS project will assess the solution proposed by the previous European Initiatives and will try to converge the proposed architectures and building blocks. The outcome of the work that will be done in the context of eSENS project is expected by the end of 2016. e-SENS results will be an input to the Connecting Europe Facility programme.

Therefore, Member States and Public Administrations must be actively involved in these actions. Private sector has also a crucial role in terms of sustainability for designing new products that will be based and/or be interoperable with these solutions. Every aspect must be taken into account so that the offered services can be utilized from citizens and business on a long term basis.

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