Service Oriented Architectures without Openness - a contradiction of terms. Reflection on the Norwegian situation.

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Abstract

Interoperability of eGovernment services is high on the agenda of the European Union. A look at the situation in Norway in the domain of learning, education and training shows that development of services are hindered by a poor understanding of the need for open and transparent processes. This paper looks into the conversational frameworks that are needed to implement the European and national goals on service oriented architectures in the educational sector. The case of the UK Australian e-Framework for Education and Research is studied to understand more of the conceptual work that underpins this kind of activities.

1. Introduction

The interoperability of eGovernment services, based on standards, open specifications and open interfaces, has become a crucial, crosscutting task, the European Commission states in a communication to the European Parliament [1]. The first version of the European Interoperability Framework (EIF) for pan-European eGovernment Services was published in 2004 [2]. This framework has been adapted by a number of European countries, also by Norway, which is not a member of the European Union. In the "eNorway 2009 – the digital leap" strategy [3] the Norwegian Government make strong commitments:

"By 2006, all public sector agencies shall have incorporated how they are going to use open standards, service-oriented architecture and open source applications in the relevant planning documents."

The Norwegian debate on eGovernment is not focused on the interoperability needs of the educational sector. It seems more urgent to be able to hand in tax declarations and to report around the clock change of residence address than having access to an online learning environment. It is therefore not yet clear how the Ministry of Education and Research will ensure that service oriented architecture (SOA) and open standards will be implemented for learning, teaching and training. Top down introduction of a new SOA framework will have limited immediate effect on institutions used to traditional systems development. This was illustrated when the Norwegian Directorate for Education and Training put out to tender an Administrative System for Educational Testing in February 2006. One could easily imagine such a system being part of an architecture for learning, interfacing with Test Banks, Virtual Learning Environments, Single Sign-on Services etc. However, the public will not get information on the new system before it is delivered. After a closed prequalification process the Directorate will present its specification to the chosen firm for development. The current thinking seems to be that a more transparent process may jeopardise progression and cause liabilities.

In this paper we will discuss the challenges of SOA adoption with focus on the educational sector. We will argue that it is not only a question of adopting a new conceptual framework. A more fundamental change of administrative practice is needed to succeed.

2. In search of conversational concepts to build learning services

"SOA is the sets of policies, practices and frameworks that enable application functionality to be provided and consumed as sets of services published at a granularity relevant to the service consumer that can be invoked, published and discovered, which are abstracted away from the implementation using a single, standards based form of interface", according to a report commissioned by the Danish Ministry of Science, Technology and Innovation [5].

The UK Government has led the most comprehensive approach to adoption of SOA in education through the e-Framework for Education and Research[1]. JISC-CETIS issued July 2004 (together with their Australian and Canadian partners) a paper [7] aimed at providing a common set of concepts and terms that could be used in conversations about e-learning infrastructures.

[1] http://www.e-framework.org/

A *framework* provides a vocabulary and grammar but it is left to the individual organisations to write the stories. A *Reference Model* is a selection of Services defined in one or more Frameworks. A *Design* specifies an *Artifact*, such as a piece of software, and is a collection of specific technologies applied to either a Reference Model or the Framework [7].

This model was presented in November 2004 to a community of developers within higher education together with an introduction to Web Services and the clear message to go build the "wall of services".

One year later the same group met again for the second JISC CETIS conference. Now the community aspect of SOA was more in the foreground. "Why reference models?" asked Bill Olivier in his keynote [4]. He wanted to avoid the number one reason for project failure in software development, lack of user involvement. A dialogue is needed between users and technologists, Olivier concluded and introduced the concept of Reference Model as a kind of boundary object for this dialogue [6].

Reference models bridges the world of users and their work with the underlying technical services and their associated specifications. We have a human context that needs to be made clear, with stakeholders, purposes, processes and practices; and we have a machine context with applications and services, and specifications that integrate them.

3. Implementation of Service Oriented Architectures – a multi-layered process

The UK led e-Framework endeavour is an example of applying a domain approach to meet the goals set in the eGovernment strategies of the European Union. The work is carried out almost without reference to these pan European visions. The situation in Norway is quite contrary; we have European visions and national goals but very little domain activities (at least in the educational sector). A central principle in the eNorway strategy is that the different public sectors take full responsibility for their own ICT and service development – and they control their own pace.

The e-Framework presupposes that there is a community of developers that could be mobilised to build the framework through an open conversation coordinated by national educational authorities. There are no such coordinating and funding agencies in Norway. The community of developers is less organised, and do not have a clear vision as to which services that are needed in learning, education and training.

The European Interoperability Framework for pan-European eGovernment Services [2] does not give guidance to how authorities and institutions should organise their work processes. Semantic, organisational and technical interoperability presupposes to a large extent open processes between systems. However, once we put a governmental institution into the equation we find that these kinds of systems have a multi-layered mixture of open and closed processes.

In figure 1 we have identified four distinct layers that fall into two categories. In one way it is Academia meeting Government, which is in fact the case when Ministries of Education are commissioning software for learning, education and training. The problem arises when the red line between the decision-making and administrative processes is crossed and "the light is dimmed" for necessary knowledge processes.

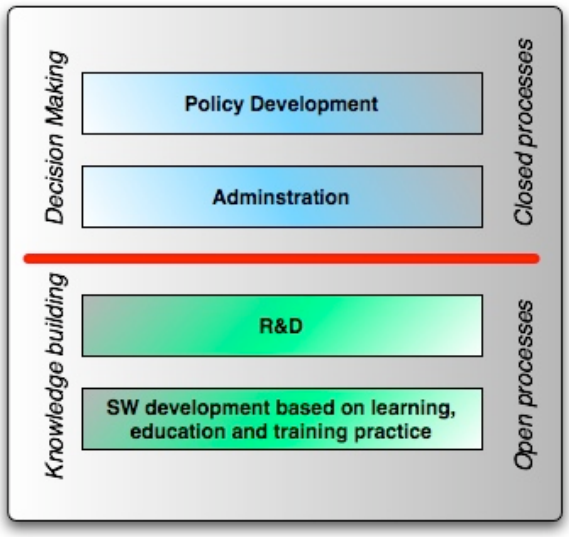

Figure 1. Process layers within governmental institutions.

We have examples of projects in Norway where knowledge-building activities have been met with a decision making logic where control of information has been the leitmotif. For a country with scarce access to experts and a weak professional discourse one year's halt in a field as agile as ICT and learning could be devastating.

With Service Oriented Architectures being a new software paradigm we could foresee that a small country like Norway could be set back if we are not able to discern between the different types of processes. This is because much of the software development has been left to the market, managed by the vendors alone or in a closed relationship between public authorities and a small number of software and consultancy companies. It is not possible to put SOA out for tender as such. Someone has to do some orchestration to come up with the right factorisation of

the services that should be developed. And those orchestra rehearsals have to be done in public as a knowledge building exercise, for the developing community to be able to pick up the right tones and subdue the false ones.

4. Conclusion

If the EU policies on open standards, service oriented architectures and open source shall have any impact on the development of technologies for learning, education and training the Ministries of Education have to rethink the way they handle their knowledge building and decision making processes.

Up till now we (to a large extent the vendors) have built individual systems, e.g. Student Management Systems, Learning Management Systems, Test Administration Systems etc. When these systems start to crackle into services the Ministries suddenly are faced with the need for orchestration. Some of the services are vital to society (e.g. security, privacy, data protection, exam systems etc.) and cannot just be left to "the market" to develop without an open and common architecture.

A common architecture for learning, education and training must be built upon up to date knowledge through research and development activities in close connection with communities of practice. These knowledge-building processes could collide with the public management culture of educational authorities with the result of open processes being closed for some periods.

To follow up EU and national goals on SOA the government bodies should be very careful to define which processes should be open and which should be closed when they for instance commission reports, put out bids for tender etc. One single paragraph of recommendations in a full report to the Ministry on a technical issue could be enough to keep it from the public eye for months.

To lift the administrative veil from knowledge processes is not enough to harness a service oriented architecture. The UK Australian e-Framework exercise to forge adequate concepts to grasp the essence of the bricked wall[2] they are building is worth a study for Ministries not participating in this effort. What should be noted is that several of the concepts (e.g. Framework, Reference Model, Design etc.) have a dual nature. They are precise technical concepts that are used in formal models, often expressed in UML diagrams. On the other side, they are soft concepts that are meant to bridge the user community and the technical community by facilitating the professional conversation between stakeholders. The very fact that communication and dialogue is built into these concepts that are essential to understand service oriented architectures, makes it even more important to facilitate development of such services as open processes. Closed SOA development is a contradiction of terms.

[2] The *collection of domain services and common services in the e-Framework is often referred to as "the Wall", see* http://www.elframework.org/learning_domain_services *and* http://www.elframework.org/common_services)

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