A Framework for Evaluating Compliance of Public Service Development Programs with Government Enterprise Architecture

Katja Liimatainen, Jukka Heikkilä and Ville Seppänen
Information Technology Research Institute, University of Jyväskylä, Finland
katja.liimatainen@titu.jyu.fi
jukka.heikkila@jyu.fi
ville.seppanen@titu.jyu.fi

Abstract: In the context of public government, enterprise architecture means a way for systematic description and planning of cross-sectional services. This is done by aligning existing resources with information and communication technology investments to ensure national and international interoperability. Governing interoperability across organisational domains requires that public agencies take into consideration other parts of the public sector and engage to courses of action that are commonly agreed upon. As many of the intra- and inter-sector information and communication technology initiatives seem to still end in trouble, the panacea considered is government enterprise architecture (GEA). GEA work is in the agenda of many governments. However, the successful implementation of such programs has been problematic.

In this paper, we describe the nature of public sector transformation with GEA. Based on the findings from the first round of the Finnish Interoperability Programme developing the GEA and our follow up research, we identify areas for improvement. After that we analyse the governance model for GEA compatible program initiatives. We propose a tentative framework for evaluating public service development programs' compliance with GEA. The framework is based on practical requirements that have emerged during the ongoing development of GEA in Finland. Framework describes how a program initiative needs to be handled in the GEA approach. The framework is guiding the procedure of implementing a program with quality assurance and monitoring measures. We also include an additional stage of business modelling, because of the observed problems of government agencies not being capable to look outside their box and innovate. The framework helps in evaluating the costs, benefits and beneficiaries of the expected outcomes of the program; the beneficiaries being as well government, citizens or private businesses, or any combination of these. The results of this study are of interest for both practitioners and academics in the field of enterprise architecture.

Keywords: Government enterprise architecture, electronic government, public service, development Project

1. Introduction

Archetypal public administration is hierarchically organised bureaucracy, where the responsibilities are clearly divided within the ministries' administrative subject fields. Initiatives are proposed to civil servants, who push the decisions higher on the organisational ladder by careful preparation on which democratic decisions are based. In addition, hierarchy is harnessed for delegating tasks and responsibilities along the line of command, indicated, for instance, by orders signed with stamps. In most Western societies the paper based processing has been replaced with information systems, wherein processes and decision rules have been hard coded. This trend has further reinforced the bureaucracy.

The digital era poses challenges to the public administration: The citizens are information and communication technology (ICT) literate, they are to growing extent having access to the public information at their fingertips. Yet, because the public administration, by definition, is for all, the civil servants are mediating the citizens' initiatives between the forms and decision makers within their silos. However, under growing cost pressures and the changing citizen capabilities, most governments attempt to modernise their operations, citizen interfaces and introducing self-service with the help of information and communication technology. We are finally seeing that the use of ICT tools and applications is leading to transformational shifts in public policy, processes and functions (UN 2008). This is not just automating processes or information gathering for decision making, but attempting to make fundamental changes to the processes at all levels (Mooney et al. 1996).

The calls for more efficient and streamlined public administration mean that more and more often the administrative burden to the citizens and other stakeholders, such as private service providers, count (Lau 2007). Against this backdrop, it becomes crucial to optimize the burden of administrative processes (they can be described as long administrative transactions) from different stakeholder's

viewpoint. Hence, this leads to redesign of the public sector as a whole (Mayer-Schönberger & Lazer 2007). In many nations, the governments seek to offer their citizens a seamless service delivery as part of the public sector modernisation plan (Liimatainen, Hoffmann & Heikkilä 2007).

Governments are simultaneously trying to improve the service delivery and efficacy of government functions. This requires rethinking the role of ICT, by increasingly looking towards e-government-as-a-whole concept. It refers to government agencies working across portfolio boundaries to achieve a shared goal and an integrated government response to particular issues. (UN 2008) Earlier political and managerial focus was on developing electronic services within each public organisation with limited consideration of cross-organisational coherency, the focus today has clearly shifted towards co-ordinated services offering one-stop shops to citizens and businesses (OECD 2007). One solution for intertwining disjoined e-government projects has been initiating a government enterprise architecture program. Enterprise architecture is a hierarchical approach for aligning business and ICT (Langenberg & Wegmann 2004) and it describes how the information systems, processes, organizational units and people in an organization function as a whole (Morganwalp & Sage 2004).

Some key prerequisites for the ideal seamless service delivery are free flowing information between authorities, power to change processes across administrative areas and new service concepts, which are implemented in an efficient way with the help of interoperable ICT systems. In spite of that, public sector ICT initiatives are mostly still developed in silos with too little attention to other actors in the government, or to the total administrative burden to the stakeholders. This new kind of service delivery requires interoperability. *Interoperability* is defined as an ability of information systems and of the business processes they support to share and exchange information (IDABC 2004). Policymakers initiate government enterprise architecture (GEA) programs to ensure interoperability, avoiding duplication efforts and enable government wide reuse (Janssen & Hjort-Madsen 2007). Hence, GEA programs face challenges related to integration and interoperability within and between public agencies (Hjort-Madsen & Burkard 2006). Overcoming these challenges is found out to be difficult (Isomäki & Liimatainen 2008). Government structures often impede GEA programs from succeeding (Hjort-Madsen & Gotze 2004).

The article is organized as follows. In the second chapter we describe the problems that GEA attempts to solve with illustrative cases. In the third chapter we argue the need for a framework for evaluating public service development programs' compliance with GEA and in the fourth chapter we will describe the framework for interoperable public service ICT development. The fourth chapter concludes the work.

2. Public sector transformation with GEA

In the business sector enterprise architecture (EA) is a tool for strategic management, supported with business and operating model mappings with ICT infrastructure. In other words, to our understanding an enterprise's mission, vision and strategy are reflected in the form of business model to different operating models and ICT infrastructure alignment. This development has been accelerated with the emerging promise of business modelling relying on modularised patterns and components instead of mere integration.

In governmental context, EA is mostly used as tool for integrating independent organisational and information and communication technology silos, as component based development is still rare. GEA is increasingly used to set the framework for developing public services and information systems in line with the administrative objectives. For example, by identifying, structuring and categorising organisational elements, GEA can increase the potential for cross-public sector reuse and reduce duplication and hence reduce costs. With GEA, the strategic goals of public sector service development and execution can, in principle, be better understood and accommodated.

In reality, the GEA initiatives in public sector have often ended up in trouble (Liimatainen et al. 2007): the prerequisites mentioned in the introductory chapter are not met, or it takes long time both to build capabilities to engage in to inarguably complex process of designing GEA and overcoming organisational and cultural barriers of thinking in terms of total administrative burden and customer processes across administrative boundaries. The complexity is due to the fact, that the variety of governmental services is vast: in modern societies they have grown to cover all aspects of life. For example, in the US Federal Government there are more than 10.000 applications, in the Finnish

government (serving population of 5.3 million) around 5.000, and in both countries the growth is accelerating despite countermeasures. Under these circumstances any approach gets burdensome, especially if you take into account the interoperability requirements stemming from the international and regional connections for the central government. However, implementation of a GEA program offers a way forward in integrating independent ICT silos across inter-organisational agencies. This integration is seen important by the most governments of Western countries (Janssen & Kuk 2006). As anticipated, interoperability and integration objectives are becoming increasingly important when governments implement and manage EA programs and governing interoperability across organisational domains requires co-operation between the agencies (Hjort-Madsen 2006).

Compared to e-government initiatives GEA programs are holistic approaches that intertwine and focus disjointed e-government projects. Governments usually have several independent e-government projects, which may have limited coherence and remain largely uncoordinated (Hjort-Madsen 2006). EA approach can serve as an umbrella for explaining the relationships among the projects and managing change. According to Christiansen and Gotze (2007) 67 percent of governments already have a GEA program and added to those the countries that are planning to have a program within one or two years the percentage will exceed 90.

The need for GEA can be understood in the light of the recent governmental project failures. In the UK, the originally 6 billion pound Connecting for Health programme faced a multitude of problems, several scope changes and give-ups by vendors and consultants, and continuous budget over-runs. The problems are deep-rooted in data conversion, legacy system upgrades, user training and meagre senior staff engagement into the design. (Meyer 2006). On the programme page, it is stated that the budget is now 12.4 billion pounds for next ten years, *"It is better to get the tasks right rather than sticking to a rigid timetable",* and *"The National Programme for IT [=NHS Connecting for Health] is a platform that will ensure that all systems within the NHS (National Health Service) can work together"* (NHS 2008a). The latest estimate the new ICT systems in the NHS are to deliver better care and an estimated 1.14 billion pounds in savings by 2014 (NHS 2008b). It seems that after the first failures, the sheer size and complexity of the projects requires EA approach.

There are some governments that are forerunners in GEA work, for example, USA and Denmark. Even in these countries the implementation of GEA has not been without problems. The fast advances in GEA work in the USA's Federal Enterprise Architecture (FEA) are because of the use of legislation for certain governance aspects from the beginning. Most notable are the Government Performance Results Act of 1993 and the Clinger-Cohen Act of 1996. The former is to increase the transparency of government projects in terms of objectives, performance, effectiveness, and invested funds. The latter defines that acquisitions, planning and management of technology must be treated as a capital investment in co-operation with related authorities. The GEA includes a governance model, which includes the necessary activities to estimate, conduct and revise EA. It also defines the roles of different stakeholders and most importantly in Federal Transition Framework (FTF) the relationship of layers from performance evaluation and business/component modelling to data and technical reference models.

In practice, Hjort-Madsen's (2007) study showed that the federal agencies in the USA adopting EA planning are struggling to show how information systems planning can be a driver for administrative reforms and transformation in government. At the moment, the chief information officers (CIO's) rarely have control over IS budget and have problems while trying to get the IS planning into the management agenda (Hjort-Madsen 2007). Yet, Office of Management and Budget has estimated to reach 16-27 percent annual savings in infrastructure costs due to FEA. If we compare FEA to e.g. the Danish GEA, the latter is facing the risk of failure in the implementation phase, since the GEA is lacking a strong governance model (Janssen & Hjort-Madsen 2007).

Several countries have set increasing interoperability both between administrative branches and with suppliers a central goal. This requires cooperation across administrative branches, which is often a new and different kind of work practice for hierarchically organized administration. This causes certain kinds of challenges in the GEA implementation phase and particularly the role of governance models becomes salient. (Liimatainen et al. 2007) Architectures evolve over time and consequently governance structures and mechanisms are needed to guide and encourage desired development.

3. Demand for an evaluation framework

Governments are still today mostly unable to objectively quantify and show the benefits and returns of ICT investments and e-government efforts, although measuring has constantly gained momentum and attracted interest and efforts from policy makers, practitioners, industry and academic experts (OECD 2007). The prerequisite for measurement is that governments set quantitative and qualitative goals for their GEA programs and ICT projects. The achievement of these goals should be monitored through governance model and structures, the best example being the FEA.

The Finnish case shows the typical features. Government established Information Society Programme (2003-2007) that included regional projects, to promote local online public services. The National Audit Office of Finland (NAO) audited the programme and found serious shortcomings in the implementation and governance. According to NAO the programme had unrealistic and unclear objectives in relation to the timetable, available personnel resources, the governance model and allocated funds. The achieved results were fragmentary and modest compared with the original objectives. The implementation as small regional projects led to overlapping and fragmented online services. This was not expedient since the goal was to develop online services in the national-level. (NAO 2008) As a conclusion, The NAO stated that the governance of the projects should be centralised and managed at the national level. In the future the governance of cross-public sector programmes should be comprehensive and ongoing. The audit report concluded that the Information Society Program did not succeed in eliminating overlapping and competing projects. In fact, in some cases the results were reversed. (NAO 2008)

Since the 1990s, Finland has been a leader in exploiting ICT to renew its economy and to reform its public administration (OECD 2003). However, in the United Nations (UN) e-Government Readiness Index Finland ranked 9th in the year 2005 and relegated to the 15th place in the 2008 (UN 2008). According to OECD (2008) there are challenges in the Finnish economy. They are making public spending more cost effective with more competition between public and private providers of services and a level playing field ensured. This development has been foreseen some time ago before the latest UN and NAO reports, and corrective measures have been started in the Finnish government. The Council of State decided in June 2006 to create prerequisites for customer-oriented flexible services and strengthening the transparency of administration by revising the long term objectives for the government's ICT operations, development strategies of ICT functions, the common governance model, and the development programmes for the years 2006-2011. Among them the *Interoperability Programme* is to decrease overlap in information collection and maintenance as well as the overlap of ICT systems. The main goal is to increase flexibility by creating a common state ICT architecture (the Finnish GEA). It is the tool for guiding the development of processes and ICT systems at all levels of state administration. It includes a governance model for maintaining the architecture and utilising the descriptions of the architecture in the steering of projects and systems design. (Ministry of Finance 2006) The State IT Management Unit is responsible for the organisation of the programme and we have been following the progress of this programme from soon after its launch in 2006.

After the completion of the first round of the Interoperability Programme projects, we were able to summarise following issues hampering the achievement of objectives. These were picked out from the series of reports of the first stage of the programme and from our studies:

0. Management direction setting for programmes is mostly driven by internal efficiency improving logic instead of optimising administrative burden.
1. In many cases, (as stated in NAO's 2008 report), the objectives are unrealistic, too vague, and either not in relation to the everyday activities or aiming at too high a target without taking into account the resource limitations and the rule-based nature of the public administration.
2. The Finnish GEA method is demanding to implement and brings the cultural clash of functional administrators vs. process oriented reformers on the surface.
3. Data is not properly described, organised and maintained to facilitate secure and record-based retrieval and updates.
4. Tools to guide and draw up the GEA descriptions are not set. Therefore, different interpretations on the use of GEA may result in incompatible products and hinder interoperability.
5. Governance model lacks steering power and authority.

After a number of discussions with the problem owner, The State IT Management Unit and major ICT vendors, we have come to a following five points of issues to be dealt with the governance model, when designing a solution to an administrative service:

1. How to define the objective of the program in a concrete enough way? New programs should aim at innovative but feasible improvements instead of just saving costs. We believe that external views are needed for creative thinking. Along the development, the expert opinions from government are needed both in setting the objectives and insight of the practical implementation.
2. How to measure the performance of the improved system from administrative burden point of view? This calls for estimating the benefits and costs both from the responsible agencies and other stakeholders' points of view. The government should use its Balanced Scorecard variant (called Tulosprisma that consists of four type of indicators: Societal impact, Resources and finances, Processes and structures, Renewal and working ability).
3. How to measure, follow and evaluate the invested funds pay-off?
4. How to ensure interoperability from work processes and data compatibility viewpoints? Here the GEA compliance evaluation should play a major role.
5. How to ensure quality in all the above stages and in use of the GEA methodology? As pointed out by the NAO and other studies, monitoring and quality assurance must be built into the procedures.

Using the former questions we develop an evaluation framework.

4. Framework for evaluating public service development programs' Compliance with GEA

We propose a tentative framework for evaluating public service development programs' compliance with GEA. Framework is based on practical requirements that we derived above from the ongoing development of GEA in Finland. In our opinion, the key element in avoiding the previously mentioned problems, is to use a *standardised way to initiate new programs* for operations, service or ICT systems development in the government. The framework is guiding the procedure of implementing a program with quality assurance and monitoring measures. We also include a, not so common, additional stage of business modelling, because of the observed problems of agencies not being capable to look outside their box and innovate. The framework helps in evaluating the costs, benefits and beneficiaries of the expected outcomes of the program; the beneficiaries being as well government, citizens or private businesses, or any combination of these.

The framework (Figure 1) can be used by a government to evaluate whether to finance a program and to elicit if the program and individual projects are in compliance with the GEA. The framework is valuable in the countries that have complicated silo-based bureaucratic governmental structures. However, it is not as valuable for the countries that do not have as much administrative burden.
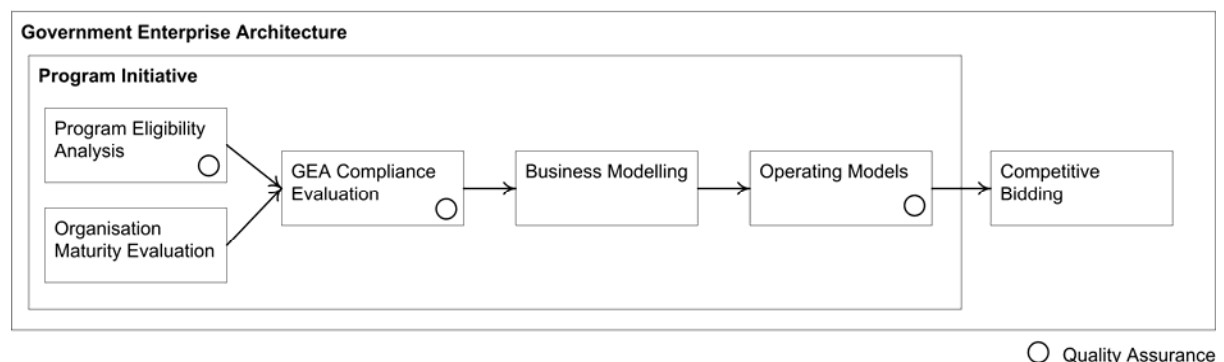

Figure 1: Framework for evaluating program initiative's compliance with GEA

An initiative for a new program can come from citizens, government programme or government organisations. Every new program is looked through the GEA. GEA covers the prerequisites set by the legislation, government programme etc. The government's strategy and goals for service delivery are included into the GEA. GEA serves as the operational environment and it describes the current and desired state and the road map to the desired state. Key attributes are, for example, clearly defined goals and government's service portfolio. Operations models, standards and system

components can be included into the GEA. GEA defines which kinds of programs and projects the public administration enforces and finances.

First, the analysis of *program eligibility* is ideally done by a number of stakeholders: the financial analysis is of special interest to government and agencies, whereas the long term government objectives evaluation is crucial to the citizens and companies. To achieve the best results quickly, it is important that most stakeholders are to participate. Here the administrative burden measures (such as the set of factors suggested by Lau 2007) can be used to achieve balance between financial and functional performance. The methods serve here as the vehicles for quality assurance, and at the eligibility analysis it is necessary to monitor key performance indicators by auditors. This should be tightly connected to the government programme and target setting to make the objectives realistic and aligned with the societal impacts.

Working in parallel, it is necessary to evaluate the capabilities and readiness of involved parties to guarantee sufficient premises for the program implementation. This includes mapping the *maturity* of processes, rules and regulations, and information systems for any cross-sectional requirements. This is also to find out what kind of resources are needed. It includes evaluation of the additional education that is needed for the personnel to be able to participate in the implementation of the programs results that are for example new services. Maturity evaluation is in the prime interest of the agencies management and experts.

Before moving ahead, the results of previous two tasks should be compared against the requirements set by the GEA to ensure the quality and the compliance with GEA. *GEA compliance evaluation* is the means a government can coerce national or sector standards, and utilise the existing infrastructure and shared services to their full potential before further investments. At this stage the EA descriptions are drawn. This task requires a holistic view from the top and detailed descriptions from related sectors and actors. This can be provided for example by mapping the services provided by different organisations into a government service portfolio.

At this stage, the objectives, existing resources, interoperability requirements and the capacity for changing the present system have been covered. Before rushing to the implementation, we suggest taking another look at the requirements in respect with the targets and performance indicators. A promising approach is *business modelling* (e.g., Gordijn 2003; Heikkilä et al. 2007), where the parties think through the ways to organise the activities and their roles in the most meaningful or profitable way. This is clearly in the interest of the involved agencies' management and experts, but it is most likely to require an outside view to innovate. Consultants, software vendors and research institutions may well serve for this purpose.

After the business model is designed it is time to choose from alternative *operating models*. With operating models we mean the set of resources to accomplish the desired targets. In addition to the agency personnel and information systems, these may include outsourced resources such as public-private partnerships. As operating models are typically constrained by present regulation and cost feedback from the earlier stages is required. This task is clearly within the authority of involved agencies' management, together with GEA experts (e.g. the CIO council). Quality assurance is necessary at this stage to ensure the necessary information for the next stage.

In addition, to the quality assurance mechanisms, the program initiative will be monitored and audited by independent authorities for quality and achievement of the expected outcomes. In our opinion, it is worthwhile to take the first audits of feasibility before the program initiative is moved to the planning stage. Additional audit points at the completion of program eligibility and maturity stages are needed for the assurance of continuous improvement. Finally, the operating model serving as a basis for competitive bidding and request for quotations is very important under the present legislation on public procurement (at least in Europe).

5. Conclusions

GEA work is in the agenda of many governments. However, the successful implementation of such programs has been problematic, as the experiences and evaluations from the UK *Connecting for Health* and the Finnish GEA illustrate. On the other hand, we have enough evidence to indicate that there is hardly any other way to go, but to increase national level monitoring and quality assurance

mechanisms to the programmes. In the contrast, governments that have less administrative burden do not need this kind of holistic approaches.

The simultaneous attempts to develop better public services and lessen the administrative burden to citizens and companies, increases the need for new ways of administering. The general belief is that with the help of modern distributed and component based information systems approach, substantial improvements can be achieved. For example, Estonia's standardised technological platform has enabled a fast and cost-efficient way of developing new services.

Based on the findings from the first round of Finnish GEA Interoperability Programme and our follow-up research, we identified five areas of improvement. Building on these areas, we depicted a framework for ensuring the compliance of public service development programs with GEA with sufficient quality assurance and audit mechanisms. In essence this means putting more emphasis on the participation, division of responsibilities and re-visiting the design for innovation before moving to actual implementation. With the help of the audits the agencies can improve their maturity for interoperable cross-sector services in a systematic manner.

Although, it is easy to see this will increase the activities, time and cost during the development program. Yet, we firmly believe that especially in the countries with thousands of application software installed and advanced legislation, this is going to be worth the effort. As the UK experience suggest, *"It is better to get the tasks right rather than sticking to a rigid timetable."* (NHS, 2008).

In the future we will do action research on the proposed framework: first by testing the idea with different stakeholders and then with a program initiative in Finland. Another pending need is to take advantage of a more interactive, participatory process of creating and introducing new services.

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