The Entanglement of Enterprise Architecture and IT-Governance: The Cases of Norway and the Netherlands

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Abstract

Governments are developing infrastructures to spur e-government development. These e-government infrastructures are based on the notion of ICT as a utility that can be (re-)used by organizations at all levels of government to create their own service provisioning and to facilitate interaction with each other. This paper investigates the development of such infrastructures by looking at regional and national aspects. A cross-country comparative framework is developed and 2 countries are analyzed. We found that infrastructure development in both countries is similar at a global level, yet the governance is different. While Norway aims to enable integration by developing a Business Process Management building block on the national level, in the Netherlands local governments compose and integrate the building blocks with implementation support from the national level. These differences between e-government infrastructure developments of the two countries can be attributed to the degree of centralization of government and the degree of active support given to e-government developments.

1. Introduction

To spur e-government developments, governments all over the world are creating basic national e-government infrastructures to provide generic functionalities that can be used by government agencies as services [1]. This concept is based on the idea that basic services are developed and shared among the many governmental users to create services, which is often denoted as Software-as-a-Service (SaaS) [2]. SaaS refers to a sourcing model in which software is made available as services that are provided on a subscription basis and hosted externally. The infrastructure contains these services that are provided by utilizing the SaaS business model. Governments can use the services provided by the infrastructure to create new systems by composing them out of the available services. The main advantages are that organizations do not need to develop, maintain or control software themselves, but instead they can re-use existing building blocks, and at the same time a basic infrastructure stimulates standardization of services, development and interoperability. This promises to reduce control and maintenance costs [3] and e-government progress should be given a boost [1].

Development of such e-government infrastructures varies widely in different countries. They are often guided by National Enterprise Architectures (NEA), aimed at aligning business and IT and give direction to e-government developments [4, 5]. Yet, we lack research on how the design and guidance of such infrastructures should take place. Furthermore, a closer look needs to be taken at how governance of such infrastructures can be set up effectively between the central level, who are primarily in charge of developing these building blocks and the national and regional government agencies, who are the intended users. IT-governance, which is aimed at ‘to direct and oversee an organization’s IT-related decision and actions such that desired behaviors and actions are realized’ [6 p. 289], needs to manage such dependencies.

This paper investigates the development of e-government infrastructure by comparing developments in two countries: Norway and the Netherlands. These countries share the policy aim to establish an e-government infrastructure that can be employed using the SaaS business model. A systematic and structured comparison will be conducted by first developing a framework aimed at understanding and explaining the development of e-government infrastructures and address the tensions between a centralized and a decentralized service development. Nowadays it is argued and recognized that governance is required to assure consistency and timeliness of enterprise architecture [7, 8]. Therefore, we address both governance and architecture aspects. A cross-country analysis allows us to investigate differences in e-government infrastructure development across...
government organizations. Both countries are similar, but their approaches are different enough to enable mutual learning.

This paper is structured as follows. First, we develop a framework for comparison of e-government infrastructure development. Then, we investigate e-government infrastructure development in Norway and the Netherlands. After a comparison of the developments in the two countries and a discussion on the outcomes of the comparison, we present conclusions and recommendations for further research.

2. Comparative framework

Policies are formative at several levels. They shape the direction of development both in which research projects are funded and which projects are initiated and supported by the government. But despite this shared vision of the direction e-government [9] should take, the actual implementations and organization of government based on a common set of policies may take on different directions at the national and regional level within the different governments. The set-up of generic infrastructures, architectures guiding developments and governance structure are influential in determining the outcome of e-government development. Similarly, the pattern-dependencies caused by previous policies and the order of which policies are enacted, form the capabilities of the different government agencies and the governments as a whole. The infrastructure is influenced by the path dependencies, organizational readiness and implementation of the policies. NEAs are used as an instrument to guide implementation and IT-governance to direct decisions-making processes.

2.1 Architecture

The idea of enterprise architecture in the public sector is that it can be used to guide and constrain decisions and progress towards e-government. The existence of isolated, overlapping in function and content, highly fragmented, and unrelated computerized applications has led to ‘isolated islands of technology’ [10]. Architecture is an instrument to guide e-government progress and ensuring that the single elements are coordinated. Traditionally, the purpose of EA is to effectively align the strategies of enterprises with their business processes and the coordination of their resources [5, 11]. EAs define and interrelate data, hardware, software, and communication resources, as well as the supporting organization required to maintain the overall physical structure required by the architecture [11, 12]. Architecture can be viewed at various levels, including hardware, network, system, application, business process and enterprise level [12, 13]. Many governments have embraced architecture as an instrument to progress e-government [4, 14] and there are many existing frameworks [15].

2.2 IT-governance

Governance represents the framework for decision rights and accountabilities to encourage desirable behavior in the use of resources [16]. Information Technology (IT) governance involve the mechanism to direct and guide IT-related decisions by allocating responsibilities, communications and alignment procedures and processes to manage the dependencies between responsibilities [6]. IT-Governance mechanisms determine how communication, responsibilities and decision-making structures are formalized [17].

Ross [18] criticized enterprise frameworks for taking a technologist view. Frameworks do not highlight the role of institutions and capabilities critical to enabling the adoptions and diffusion of architectures. IT-Governance, or in this context architectural governance, is often viewed as a necessary conditions for ensuring success. The tensions between centralization and decentralization of IT is one of the major recurring issues in literature [e.g. 19, 20, 21]. With the advent of the Internet, web services technology has become viable to centralize functions that are currently or were formerly performed at a decentralized level. There is some disagreement in the literature about the driving forces behind centralization decisions [e.g. 19, 20, 21]. King [19] found three separate aspects, control, physical location and function that can be either centralized or decentralized. In this research the focus is on the function (infrastructure building blocks) and control (governance).

2.3. Towards a framework for comparison

An important issue in comparative cross-country research is the importance of creating a framework that allows us to compare concepts that are sufficiently equivalent [22]. Janssen and Hjort-Madsen developed a framework for comparing NEA within the public administration [4]. They used five elements 1) Policies, actors and structures, 2) Governance 3) Architecture model 4) Architecture principles and standards and 5) Implementations. In contrast to this research, the aim of [4] was to investigate infrastructure development and the impact on services. The framework for our comparative study is based on the tensions between central and decentralized actions and the use of
architecture to develop the e-government infrastructure. Government strategies towards establishing the government information infrastructures are realized by developing NEAs. At the same time, the governance and support directed at government agencies shape the individual agency’s ability to act according to policies and its ability to contribute to both individual and common goals defined by policies.

The framework we present has evolved iteratively together with the investigation and analysis of national policy documents and government initiatives. The framework model in Figure 1 describes (from top to bottom) the policies defined at a national level; these are in some way created by politicians supported by the bureaucrats. The governance measures are further formulated to support policies in the form that they have through laws, regulations or political ambitions.

Figure 1. Framework for cross-country comparison

The governance as an administrative interpretation of policies includes instructions and allocation of tasks and responsibilities for the different public agencies. To support the adherence of tasks and responsibilities, and that actions are in conformance to the objectives, architecture methods, guidelines and standards are defined and made available to the various government agencies. These can be both used to aid adoption, to monitor and measure policy outcomes, or for reference in implementation. In addition to the knowledge-based procedural support provided through methods and guidelines, infrastructure components can be provided centrally with a similar goal of supporting the public agencies ability to deliver their services effectively.

Public agencies operate at a regional (local), or national level. Regional agencies include municipalities and public agencies with a geographically limited policy domain, while national agencies are public agencies with a coordinating function or providing services at a national level. These agencies are both service providers and developers. In a national information infrastructure they can be both producers and consumers of shared services and components.

At the bottom of our model the interaction between the citizens and businesses and the government agencies is shown. Given by the numbers (1-5) in the model, our aim is to investigate the following:

1. **Organization**: What is the organizational readiness? How is the governance of e-government organized? What direct governance exists and what instructions are given to the public agencies?
2. **Architectural support**: What methods, guidelines and standards are made available centrally to the public agencies as means of support and control in e-government projects?
3. **Infrastructure**: What infrastructure (software) components are provided centrally to support service delivery?
4. **Use and adoption**: How is the governance and support different towards national and regional agencies, and what roles do these agencies play towards establishing a national information infrastructure?
5. **Services**: How is the citizen and business service interaction with respect to the regional and national agencies and the provided infrastructure?

By performing a cross-country comparison of the governance and implementation of e-government initiatives, it is possible to see what parts of the national policies have been given more attention and how the policy implementations are different. We will also be able to see what governance mechanisms that are currently at play and what support mechanisms (methods, tools, and frameworks) are being developed.

3. National government case studies

In this study we compare Norway and the Netherlands. The reason for doing a cross-country comparison between those two countries is that they share a number of institutional similarities. Both are constitutional monarchies and parliamentary democracies with around 430 municipalities and
around a dozen provinces/counts. Some basic statistics to compare both countries are denoted in Table 1. Data pairs are from 2007 to 2010, depending on availability. This shows that both are small countries having high Internet and broadband penetration. The main difference is the population density, which is very low in Norway and very high in the Netherlands.

Table 1 Key figures (taken from http://ssb.no/, http://cbs.nl/)

<table>
<thead>
<tr>
<th>Citizens (millions)</th>
<th>Norway</th>
<th>The Netherlands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pop. density pr km²</td>
<td>4.86</td>
<td>16.6</td>
</tr>
<tr>
<td>Gross domestic product (GDP) per capita in Purchasing Power Standards (PPS) (EU-27 = 100)</td>
<td>14</td>
<td>392</td>
</tr>
<tr>
<td>Unemployment rates represent unemployed persons as a percentage of the labour force (%)</td>
<td>3.1</td>
<td>5.9</td>
</tr>
<tr>
<td>Gross domestic expenditure on R&amp;D (GERD) As a percentage of GDP (of businesses)</td>
<td>1.57</td>
<td>1.73</td>
</tr>
<tr>
<td>Number of ministries (number)</td>
<td>17</td>
<td>14</td>
</tr>
<tr>
<td>Households with Internet connectivity / broadband (%)</td>
<td>86/78</td>
<td>90/77</td>
</tr>
<tr>
<td>Number of municipalities/ provinces</td>
<td>430/19</td>
<td>431/12</td>
</tr>
</tbody>
</table>

3.1 Norway

The Ministry of Government Administration and Reform (FAD) has been responsible for the coordination of government ICT policy since 2004. This includes an overarching coordinating responsibility for the ICT in the municipal sector. This is despite the fact that regional and local development in general is governed by the Ministry of Local Government and Regional Development (KRD). The Ministry of Transport and Communications is responsible for telecom policy. For ICT matters within the administrations, there are a number of coordinating bodies of a more or less formal nature, both between and within sectors.

Being responsible for the policy creation and the future strategy and directions for the development of e-government in Norway, FAD has defined the public sector as the rule maker, the pilot, the service provider, and the developer of public services. At the general level the goal is to have cohesive, safe, user-centered and efficient public ICT. Current focus areas include: better coordination of efforts and project management; Privacy matters in transfer of data in remits; Transparency in automatic processes; Open user surveys to understand satisfaction, use and needs; and understanding the need for anonymity and pseudonyms in government information systems.

3.1.1 Organization. A separate agency for public management and e-government (DIFI) was established in January 2008 as a merger of three government offices: Norway.no, the eProcurement secretariat, and Statsconsult. Responsibilities for DIFI include better integration of work in areas such as reform, ICT, management, organization, restructuring, information policy and procurement policy. Responsibility for the maintenance and innovation of the national information infrastructure framework is allocated to the Norwegian Register Authority (BRREG).

The central instrument of control the ministries have on national agencies is the allocation letter (Tildelingsbrev). It passes on economic boundaries, priorities, goals and means of reporting results for the given organizational unit.

In order to follow up and to ensure that national agencies are doing sufficient architectural planning in e-government projects, a self-declaration form is to be sent to the Ministry of Finance and FAD. This complies and is mandatory for national agencies and encouraged for regional agencies. Completing the form involves describing potential reuse of existing services, project risk and risk management, the socio-economic value generated through the project, adherence to defined architecture principles, and the use of established core components and electronic ID mechanisms. In addition to the self-declaration form, procedures for central evaluation of ICT projects have been initiated to prevent duplication of efforts. Separate procedures to evaluate the finance and budgeting of suggested ICT efforts are also initiated. All these initiatives are maintained and overseen by DIFI.

3.1.2 Architectural support. There are three contributing types of initiatives within methods, guidelines and standards that stand out in Norway. The first is the focus on competencies and cross-agency management collaboration. This is achieved through establishing separate websites for procurement and project support for managers. In addition to this, guidelines and support for planning and quality assurance for ICT-projects will be established (DIFI), and guidelines for creating socio-economic analysis as a part of project proposals is provided by the Agency for Financial Management (SSØ).

The second, is the centrally defined architectural principles that act as guidance under information
systems planning and development. The principles include service orientation, interoperability, universal availability, security, openness, flexibility and scalability. DIFI is responsible for the management of the principles and will develop models for adoption and compliance.

The third is the reference catalogue defining mandatory and suggested standards for data for government ICT systems. First launched in 2007, the reference catalogue provides public bodies, suppliers and other stakeholders with an overview of recommended and mandatory standards relevant to ICT solutions in the public sector. It is decided by the government that the reference catalogue should be used by all national agencies when planning new solutions. Work is in progress to enforce regulations so that the reference catalogue additionally will apply for the regional agencies.

3.1.3 Infrastructure. The Norwegian government is set out to pursue a cohesive policy to ensure efficient re-use of public information for increased value creation and the development of new services. Large-scale new national ICT projects are to be assessed as to whether they can use the shared ICT components or whether they may have or can develop components that can be made available to all. It is a precondition that these assessments must not result in especially negative consequences for the project and for innovative operating solutions etc. linked to it.

Already existing shared components include: Norwegian personal identification numbers (Treated as privacy sensitive information and used as an integration point in core registers), electronic ID component, the Altinn portal a common Internet portal for public reporting, norway.no/norge.no as a one-stop public service center for citizens and central citizen and business registries. A new overarching ICT architecture for the public sector is being developed. Within this architecture is the second generation national information infrastructure for Norway (Altinn 2). Altinn 2 will also contain a separate service development framework with a workspace for defining process flows comprised by service building blocks, including data submission, messaging, information services, link/authorization services, data distribution services and support for creating cross-silo compound services. The Altinn platform additionally provides interfaces for automated data delivery from businesses, acts as a centralized third party intermediary for data integration, provides multi-actor process support and allows task allocation and task sharing. All Altinn services should be created to allow web-service access as providing a web-based user interface is not required for all services.

For future service development, there are ambitions for examining how legal protection can be catered for satisfactorily in relation to fully or partially automated decision-making solutions. The government set out to review the division of labor between supervisory authorities, in processing of personal privacy data, with in the interests of facilitating closer cooperation and coordination [23].

3.1.4 Use and adoption. The regional agencies in Norway are highly autonomous and act independently. Given this, there is currently no direct authority in e-government matters that can enforce best practice or measures for increased consolidation of services. Due to this, the comply-or-explain principle is only mandatory for national agencies, but is advised as a desktop exercise where appropriate for regional agencies. Similarly the planned national information infrastructure is not customized in favor of the regional agencies. DIFI/FAD have been criticized for not supporting regional agency requirements sufficiently, and separate projects have been announced to address this problem in particular. One example of this is the need to establish shared components that can act in accordance to archiving laws in order to enable regional agencies to take full use of the Altinn framework.

Shared-service networks regional level exists, and there has been established a separate set of guidelines for municipal collaboration by FAD. Further, The Norwegian Association of Local and Regional Authorities (KS), being the employers’ association and interest organization for municipalities, counties and local public agencies have developed separate goals for e-government for the regional agencies.

3.1.5 Services. In establishing electronic self-service solutions, each public agency/sector must make relevant services available via norge.no and Altinn portals. This is in addition to any access to services available directly using the agency websites.

In order to increase transparency, a publishing service for public sector electronic mail records has been established, allowing citizens the same access as journalists to government transactions (http://oep.no/). All national public bodies shall carry out systematic user surveys that shall also include the enterprises’ outward-facing ICT services. As a main rule, the results must be published.

3.2 The Netherlands

Responsibility for e-government policy is shared between the Ministry of the Interior and Kingdom Relations (BZK) and the Ministry of Economic Affairs
There is no single ministry in charge which resulted in critiques concerning the direction and control of e-government [24]. While BZK is mainly involved in e-government service development, EZ is mainly concerned with innovation and implementation of telecom policies. Most developments to improve service delivery, however, originate within individual government organizations, often at the level of local government.

The main e-government policy currently pursued is to realize a national e-government infrastructure consisting of generic building blocks that function as Software-as-a-Service (SaaS) to be used by all government organizations. This policy, which is the responsibility of BZK, is called the National Implementation Plan (NUP), identifying nineteen generic building blocks to be implemented by all government agencies as well as developing six example projects aimed to show the advantages of e-government.

BZK and EZ are also responsible for a government-wide policy that has many links with e-government: the decrease of the administrative burden for citizens and businesses. Currently, citizens as well as businesses often have to provide the same information twice to different government organizations. By integrating service delivery of public organizations as well as integrate chain processes, the public sector aims to diminish the administrative load with 25% in 2010, which it has claimed to have achieved, as a diminishment of 28% was achieved.

3.2.1 Organization. Besides at the Ministerial level, governance of e-government resides mainly in four public agencies. The most important agency is the ICTU foundation that was set up in 2002 to develop ICT-projects for multiple government organizations. The ICTU foundation was set up to become a ‘camping site’ for cross-organizational IT-projects. The comparison with a camping site was made to show that a wide array of projects was set up within the organization, which is still a collection of loosely connected e-government development programs.

While the responsibility for the NUP is at the Ministerial level, all generic building blocks and example projects are under development at ICTU. The foundation is also responsible for the implementation of open standards and for the national e-government benchmark. Another governance activity ICTU is involved in is providing local government with guidance and advice to implement the e-government infrastructure building blocks on request.

Other public agencies involved with government e-government development are Logius, which is the organization maintaining all generic building blocks once they have been developed. Furthermore, advisory boards have been established to oversee standardization and to test all new laws and regulations on their administrative load.

3.2.2 Architectural support. To create greater interoperability and more uniformity towards citizens and businesses, a reference architecture was developed in 2002: the Dutch Government Reference Architecture (NORA). NORA has been growing since and its focus is currently shifting more towards realizing interoperability between government agencies. On the basis of NORA, a number of sub-architectures were created for specific groups of government organization, such as the municipalities, provinces and the water boards.

The standardization board holds a list of standards that need to be used, based on the comply-or-explain principle. This means that for all public IT-projects that required procurement at the European level, these standards need to be implemented or a very good explanation needs to be given if they are not. Furthermore, the municipalities have to comply with the objective that they should install a policy for using open standards. By 2009 75% of municipalities should have such a policy. Also, the standardization board will set up an interoperability framework that will be complementary to the reference architecture NORA.

3.2.3 Infrastructure. In the past, government organizations developed their own infrastructure blocks such as authentication mechanisms and electronic forms. As a result of a policy of centralization, now a set of nineteen generic building blocks has been identified to be used by government organizations to maintain their online presence and ensure interoperability. The main e-government building blocks are the Citizens’ Service Number (BSN), DigiD, MyGovernment.nl/MijnOverheid.nl, vital record registries, e-forms and the Government Transaction Gate (OTP).

Although implementation of these generic infrastructure blocks is falling behind its objectives, they are considered to be the basis of future e-government development. Furthermore, a separate policy of the NUP is to show the advantages of building services across organizations on the basis of these building blocks by appointing six example projects. Through the identification of these example projects focus is slowly shifting from infrastructure development to the development of (cross-organizational) services.

3.3.4 Use and adoption. Regional agencies are actively stimulated to implement generic building
blocks. A program organization was set up at ICTU for the purpose of implementing the infrastructure building blocks in the organizations. Furthermore, an institute for maintaining the quality of e-government in municipalities (an ICTU program) as well as a benchmark that serves this purpose.

Most large semi-autonomous national agencies, such as the Inland Revenue Service and the organizations responsible for unemployment benefits and student loans, are highly autonomous. They are also front-runners in the field of e-government development. They, therefore, are stimulated or targeted by central government policies, but develop most of their activities themselves. Furthermore, they set up a cooperative consortium called the Manifest group that actively develops common e-government projects for these executive organizations, such as the DigiD authentication mechanism.

3.2.5 Services. A generic building block specifically designed to meet citizens' needs is MyGovernment.nl, aimed at integrating all personalized service delivery of public agencies in one portal. Furthermore, a set of guidelines for citizens' interactions, the Citizens' Service Code, was developed including ten guiding principles for governments to comply with when developing and implementing services.

4. Cross-country comparison

We recognize that the complexity of e-government causes a non-discrete transition between different interacting initiatives. Further, the outcomes of the data samples are depending on the timing and current stage of ongoing policy cycles and any diffusion or macro-events occurring. The time from policy and intent to implementation can be long or short, but the observed non-existence of policies or support mechanisms might at the same time give a false impression of differences between the objects of investigation. That is, as long as the measurement of outcomes or needs for policies are left out of the investigation.

Table 2 provides a summary of the national case studies based on our framework. Overall, the studies show a great deal of similarities between the Norway and the Netherlands and we were able to identify similar structures and dynamics between equivalent agencies in both countries.

From the organizational aspect, Norway has a separate ministry for government administration and reform responsible for e-government at the ministerial level, while in the Netherlands there is no equivalent policy maker centrally. The separate e-government agencies, DIFI and ICTU have further taken on different approaches to e-government. ICTU, being established in 2002 has a history for active involvement in e-government projects, while DIFI has focused on its role as a facilitator for increased competency and management collaboration, planning and project management in e-government projects through training and online resources.

Architecture principles for e-government planning and implementation exist in both countries. But while the Norwegian principles are limited to seven principles, The Netherlands has hundreds, most which are technology-oriented and at a different granularity level. Norway has additionally established a reference catalogue for electronic formats and standards available for public agencies. One main difference between the two countries is, that in Norway, support mechanisms are organized more centralized.

Both countries have a few strong semi-autonomous national agencies that are front-runners on e-government development. National agencies in Norway are bound to comply-or-explain principles for e-government development, while in the Netherlands these organizations are more or less self-governed, even though they are accountable at the ministerial level. This allows them to autonomously collaborate within the Manifest Group. Municipal consortiums exist both in Norway and The Netherlands to allow for economics-of-scale. Again, the main difference between the two countries is that autonomous national agencies are more centrally governed and bound to standards in Norway, compared to the Netherlands. A second difference is that Dutch municipalities are actively supported and funded by the national level, while in Norway there is no direct involvement.

So far, a similar set of core components are established as part of the infrastructure development in both countries. Norway’s goal is to provide all services through portals running on this infrastructure. Furthermore, a strong focus on BPM can be found in Norway. Similar efforts are not yet present in The Netherlands.
Table 2 Cross-country comparison

<table>
<thead>
<tr>
<th>Norway</th>
<th>The Netherlands</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Organization</strong></td>
<td></td>
</tr>
<tr>
<td>- DIFI as the separate e-government agency (established 2008)</td>
<td>- ICTU as the separate e-government agency (established 2002) serving as the main focal point of infrastructure development.</td>
</tr>
<tr>
<td>developing methods and coordinate policy enactment.</td>
<td>- Provider of centrally funded competency support (active).</td>
</tr>
<tr>
<td>- Provider of competency support (passive).</td>
<td></td>
</tr>
<tr>
<td><strong>2. Architectural support</strong></td>
<td></td>
</tr>
<tr>
<td>- Centralized architecture development and translated into</td>
<td>- Centralized architecture development and translated into</td>
</tr>
<tr>
<td>domain and organizational architectures at the local level.</td>
<td>domain and organizational architectures at the local level.</td>
</tr>
<tr>
<td>- 7 defined architectural principles for e-government planning and development.</td>
<td>- Many principles, no overarching architecture of dependencies among building blocks and centralized/decentralized division of activities</td>
</tr>
<tr>
<td>- Focus on increased competencies for public agency managers.</td>
<td>- National references architecture, domain architectures guided by models and best practices.</td>
</tr>
<tr>
<td>- Improved planning and reduced project failures.</td>
<td>- Focus on (Open) standards</td>
</tr>
<tr>
<td>- Reuse of previous efforts and knowledge management.</td>
<td></td>
</tr>
<tr>
<td>- Reference catalogue for electronic formats and standards.</td>
<td></td>
</tr>
<tr>
<td>- Procedures for central evaluation of ICT-projects.</td>
<td></td>
</tr>
<tr>
<td><strong>3. Infrastructure</strong></td>
<td></td>
</tr>
<tr>
<td>- Several available core components.</td>
<td>-Several available core components.</td>
</tr>
<tr>
<td>- Central BPM tool for integrating cross-organizational processes.</td>
<td>- No central mechanism for integration. This is kept at the local level. Many bottom-up initiatives, fulfilling an urgent need of local agencies for business process management and orchestration</td>
</tr>
<tr>
<td>- Service development framework.</td>
<td>- No service development framework at the central level (although some organizations have a variety of frameworks at the local level).</td>
</tr>
<tr>
<td><strong>4. Use and adoption</strong></td>
<td></td>
</tr>
<tr>
<td>- Comply-or-explain principle only mandatory for national agencies. Requires describing use of shared components.</td>
<td>- Comply-or-explain principle for some standards only. Not all shared components and standards are part of this.</td>
</tr>
<tr>
<td>- Direct support to regional agencies from the central government on e-government matters is limited to that provided through guidelines and facilitated collaboration environments.</td>
<td>- Local governments are free to adopt building blocks and architecture</td>
</tr>
<tr>
<td><strong>5. Services</strong></td>
<td></td>
</tr>
<tr>
<td>- Services developed by single agencies should additionally be made available on centralized portals.</td>
<td>- Most citizens’ interactions are at the local level (around 75%) and with large executive agencies.</td>
</tr>
</tbody>
</table>

**5. Discussion**

In both countries many of the infrastructure buildings blocks are similar, although they might be different in their implementation. The business process management building block is the exception, which has been embraced at the national level in Norway, whereas this is left to the local agencies in the Netherlands. When looking for an explanation using the framework, we observe differences in the architectural governance (1) and in the level of active support for (regional) e-government development (2). When it comes to the centralization of governance Norway shows a strong centralization of efforts while in the Netherlands, previously implemented regional initiatives are causing fragmentation making it less likely that it will be possible to pursue the development of a single national e-government information infrastructure. At the same time, the e-government support agency in The Netherlands, ICTU, was early involved and provided direct active support, while in Norway little direct support for implementing individual projects has been provided.

Governance and architecture are strongly interwoven. The architectures in both countries show great similarities while the governance is different. The differences we observe between e-government infrastructure developments of the two countries can be attributed to the degree of centralization of government and the degree of active support given to e-government developments. While in Norway most attention is given to the national agencies, in the Netherlands great support is given to the regional agencies. One line of investigation is to find which level can benefit most from e-government infrastructures to determine which level can be targeted.

In the Netherlands many developments are driven bottom-up. Only after proven success, they are adopted at a central level. The disadvantage of this
approach is the degree of diversity and heterogeneity that is created by employing such an approach. For example, there are many initiatives of creating shared service centers at the local level, which blocks the setting up of a single shared service center. Different working practices using all kinds of applications are developed. The absence of a coordinating ministry in the Netherlands can explain the lack of focus on development of a central BPM component handling cross-organizational processes.

In Norway, central initiatives have focused on establishing portals and facilitating for increased competency for public agencies managers when it comes to procurement and project management, but also awareness of IT-related aspects as principles for architectural planning. Central government initiatives are criticized for not taking the requirements of regional agencies sufficiently into account. Bottom up initiatives through municipal consortiums are however mirroring centrally defined directions for e-government in Norway.

A result of this combination of decentralized governance and active support by ICTU is that the Dutch e-government landscape is fragmented and little collaboration can be observed. Norway, initially not providing direct support to individual agencies, has taken on a different approach: through focusing on centralized architecture development and by providing a service development framework on which individual agencies can create their own services, coherence among the infrastructure building blocks is easier to achieve. Still, e-government development in the Netherlands took off at an earlier stage as local governments could go ahead developing services for their own organization with the support of the central government, spurring adoption.

Looking at the national and regional agencies (number 4 in our framework), we see that based on democratic structure and the autonomous nature of government agencies it is not an option to enforce practices on regional agencies in neither of the countries. National agencies often have less distinct business processes and less different services to deliver than regional agencies, and are, therefore, possibly more manageable. Joining up, and having these agencies to adhere to a defined best practice is a relatively less complex task. Evolving the infrastructure to meet their needs before considering the needs of the local government agencies may be more manageable.

At the same time, the autonomy of the regional agencies in the Netherlands can be used to explain the strong emphasis on motivating them to use the shared infrastructure. Citizens still have most contact with their local governments and harmonization of local government services can, therefore, lead to an increase in e-government development and acceptance. Still, centralized development will remain necessary to ensure standardization and mitigate fragmentation of developments leading to duplication of efforts and redundancy. There are no formal mechanisms to force the use and for infrastructure building blocks the complain-or-explain principle is not used (although it is used for standards and open source). One way to drive developments further ensuring standardization as well as spurring adoption on the level of individual organizations may be to centralize architecture development, but decentralize governance.

6. Conclusions

In this paper a framework for analyzing the development of national infrastructures was presented and used to conduct a cross-country comparative study. Our framework for conducting the case study consists of five main elements: (1) governance through direct instructions, budgets, and regulations, (2) architectural methods, guidelines, and standards, (3) information infrastructure (4) the roles of regional and national agencies and (5) the service interactions between citizens businesses and public agencies. Using this framework Norway and the Netherlands was compared.

The comparison shows that governance and architecture are strongly interwoven. The architectures in both countries show great similarities while the governance is different. The differences we observe between e-government infrastructure developments of the two countries can be attributed to the degree of centralization of government and the degree of active support given to e-government developments. Norway has centralized IT-Governance, whereas in the Netherlands this is decentralized. As a result in Norway most attention is given to the national agencies, in the Netherlands much support is given to the regional agencies. The form of governance adopted can also explain the differences between one of the infrastructure components. While Norway enables integration by developing a centrally provided Business Process Management building block, in the Netherlands regional governments compose and integrate the building blocks. In the Netherlands this has resulted in a large number of different approaches to integration of developments originating within single organizations and generic building blocks.

The findings suggest a high level of entanglement of governance and architecture aspects as they
influence the development of the infrastructure. Further research should be looking at the advantages and disadvantages of and interdependencies among centralized and decentralized development and governance. While centralized development suggest more standardization, decentralized development suggest a faster development and acceptance of e-government at the local level. This may be investigated by comparing additional countries.

7. References


