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Architecture for e-Government in Denmark
Challenges and Initiatives

Postscript to the Nyborg Conference, March 2004

**Ministry of Science
Technology and Innovation**

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Architecture for e-Government in Denmark
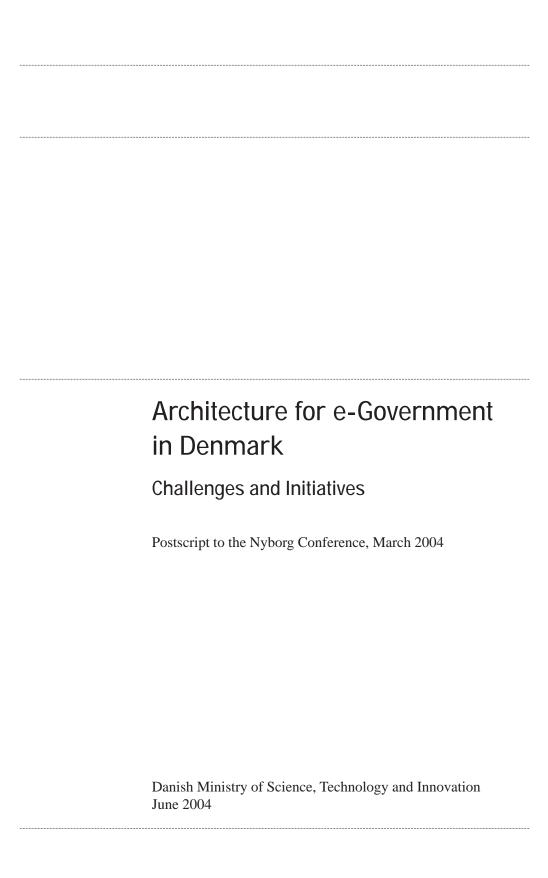
Challenges and Initiatives

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Introduction   >

As have a number of other countries, Denmark has long recognised the necessity for a binding collaboration with centrally coordinated enterprise architecture in public administration, regardless of whether the background is a vision of e-government with better service, a catastrophic event such as September 11 or the comprehensive reform of the structure of the public sector.

In Denmark, there is widespread unanimity concerning the goal: an efficient and coherent public administration. From the point of view of architecture, it is above all a question of breaking down traditional administrative silos using solutions designed for closely defined needs. E-government in Denmark is not controlled by centrally defined laws and regulations but through a shared recognition of how the objectives can be achieved.

Against this background, the Ministry of Science, Technology and Innovation and the Danish National IT and Telecom Agency together with Local Government Denmark (LGDK), the Association of Danish Regions, NGOs and a broad range of suppliers arranged a major conference held in Nyborg in March 2004 entitled *Architecture for e-Government.*

This publication underlines the central messages, which emerged from the conference. It provides an overview of the challenges, which we face in Denmark, and the solutions, which will propel us further along the road.

Denmark in the Yellow Jersey   >
– but there are major challenges ahead

International comparisons point to a leading position for Denmark with work on e-government well matured; in fact, according to the consultancy firm Accenture's annual survey of global e-government leadership, Denmark leads the field in Europe, surpassed only by Canada, Singapore and the USA at global level. Other surveys from the EU and the United Nations confirm Denmark's vanguard position.

Consequently, Denmark has a firm basis upon which to develop e-government. But many challenges still remain. Thus a survey carried out by Statistics Denmark shows that authorities still encounter barriers, including that the systems are difficult to integrate (79%) and that there is a dearth of common public solutions (80%).

Although things may be going well, realising the visions and objectives of which e-government is an expression is not without problems.

At the Nyborg conference, Minister for Science, Technology and Innovation Helge Sander singled out three challenges to be overcome:

> The entire public sector needs to get better at working across departments and areas of responsibility. Instead of the individual authorities and institutions elaborating their own silo-oriented IT solutions, systems should be opened up so they work together.

> Work processes must be digitalized and made more efficient with the citizen at the focal point. This must be done in a way that enables both short-term and current problems to be solved, whilst at the same time ensuring benefits in the longer term.

> There must be increased competition in the IT market with open interfaces and common public standards. Trans-

parency must be created in order to provide individual administrative units with a greater choice of suppliers.

The path we need to follow

In order to fulfil the goal of an efficient and coherent public administration, the Danish Government has adopted an IT policy, which has three main elements:

> The public sector – individual authorities and joint projects – should take active responsibility for its own enterprise architecture.

> A common enterprise architecture framework is being established for the planning of public IT systems in order to ensure interoperability.

> Considerable efforts must be made to propagate knowledge of and develop expertise in enterprise architecture and the joint public initiatives.

Based on these elements, the Government together with its local government partners has established a number of targets for e-government, which include:

> That no more than 15 per cent of all public authorities should indicate a lack of common public solutions as being a barrier of major importance (2003: 30 per cent).

> That no more than 15 per cent of all public authorities should indicate a lack of common public standards as being a barrier of major importance (2003: 22 per cent).

> That at least 90 per cent of all public authorities should have an updated IT strategy with regard to service, management approved security policies, infrastructure, etc. (2003: 66 per cent).

What is architecture for e-government?

Enterprise architecture is not primarily about technology, but is equally about work processes and business methods and about creating good, functional solutions. The fact that authorities take responsibility for their own enterprise architecture, in itself, indicates a strategy change for public administration, in that it requires the use of IT by the administration to be systematically integrated relative to their business needs.

The architecture work involved in a digitalization project starts with the overall visions and objectives. The next step involves the analysis and arrangement of business processes, focusing on those work processes, which must have IT support and which to a greater or lesser extent are to be standardized. Next, it is a question of getting to grips with information flows and needs. Until this stage, those fulfilling the roles of architects are probably mostly people with domain expertise.

Matters do not get really technical until the architecture of the functional components is to be set up, along with the principles for the exchange of data with the establishment of formats and protocols.

Finally, the architecture of the fundamental technical conditions relative to platform, networks and security is established.

Architecture for e-government is a prerequisite if citizens are to have freedom of choice, and consequently it is very much a matter of joint public concern. Therefore, conforming to the common architecture is a natural requirement to place on suppliers.

Service-oriented architecture

The core of the service-oriented architecture is that authorities and others exchange data via standardized interfaces and can migrate functions into each others' systems.

For instance, by using web services, a system can make data and functions available to other systems, facilitating, for example, the building-up of online self-service facilities for citizens and business capable of integrating data and functions from several different authorities.

One example worthy of mention is the case administration process, where different stages of case work are handled by a number of authorities and where different system owners maintain different data. To make it all work, all the players involved must set up their IT systems so they are able to exchange data and function calls via standardized web service interfaces. In addition, common rules of play with regard to security, data processing and finances must be adhered to.

It is crucial that all authorities give their support. Among other things, this requires:

> That each authority is responsible for the applications linked to the processes owned by the authority.

> That each authority updates and cares for its own data and ensures that it is sufficiently consistent in quality for other authorities to rely on if it is to be re-used.

> That everyone uses open interfaces based on common standards for data and services.

> That a service offered by one authority is available to other authorities in order to minimise wastage and to avoid the same solutions being developed several times at several locations.

Re-use is yet another important factor in addition to standardization; this applies not only to data but also to tools. If, for example, all local authorities are going to be able to link up to one portal in the healthcare area or the roads area, there is no reason not to re-use the experience already gained.

In order to keep the entire architecture process from vision to choice of solutions on track it must be founded on a number of overall principles. These principles are characterised by the fact that:

> They reflect the vision of an improved way of using IT in the business processes.

> They provide unambiguous guidelines for the more detailed architecture work.

> They provide motivation and benefits.

> They will endure over time.

> They have clear consequences.

Digital leadership by the authorities

A good future enterprise architecture not only depends on initiatives initiated by Government, under joint public auspices, or, for that matter, by the EU. The individual authorities must also play an active role in starting a number of initiatives.

Where the individual authority is concerned these include:

> Senior management putting issues pertaining to architecture on the agenda and establishing the overall principles involved in digitalization projects and all IT purchases.

> Establishing specific targets, making clear which benefits are to be obtained and ensuring that these are reaped.

> Requiring all suppliers comply with the common requirements.

> Requiring one's own IT organisation be familiar with and keep itself updated on common public architecture activities both in the general area and within the relevant domain areas.

> Providing the relevant staff with opportunities for developing their competencies so they can fulfil their role in the architecture team, etc.

The role of authorities is undergoing change. The classic role as supplier of services to citizens and companies is being thoroughly challenged by the many new opportunities enjoyed by citizens for selecting channel. Authorities need to regard themselves as:

> Service providers for end-users, e.g. the town hall, rapid service counters, own websites or national portals.

> Sub-suppliers of data and services, e.g. to other authorities and private portals.

> Partners in service communities, e.g. with neighbouring local authorities, other authorities or private citizens.

> Partners in development projects, e.g. with suppliers.

Incentives are needed

One of the problems involved when an authority is to start up an IT initiative is how to make the benefits clear to leadership. The value-creating element in new IT investments is very much

associated with interoperability across authority boundaries, and therefore the best picture of the benefits is to be obtained by taking an overall view. We have seen several projects where initial costs have been considerable and have not provided a good ROI (Return on Investment) for the parties who were to finance the investment. But when viewed in the broader perspective and by taking overall lifetime costs into account, often an entirely different and clear business case for society as a whole emerges.

One of the most obvious next steps in the development of the framework of e-government is to identify models capable of dealing with such contradictions. One way forward may be to test incentive models in one or more core areas where pioneering work is both necessary and profitable.

The process is important

When recommending and approving standards, it is important that they be efficient, widely used and easy to implement. Authorities and suppliers should view the recommended standards as a natural choice, and should only choose alternatives as a last resort.

This makes great demands on the standardization work, which must be capable of being carried out in a dynamic environment and sufficiently flexible to be adapted to changing needs and conditions. Therefore, standardization work in Denmark is anchored in joint public committees and uses processes which offer comprehensive consultation opportunities and the active involvement of interested parties.

Common solutions do not always necessarily imply central solutions. E-government must be viewed as a process driven by agreement between the public parties on the objectives, in dialogue with IT suppliers, education and training institutions, standardization bodies and NGOs.

Standardization and common solutions based on discussion, negotiation and joint development work in, for instance, committees made up of all the involved parties is the way ahead. So this is in no way a centralistic process. The continuous standardization process takes place against the background of an open, democratic process.

Support tools for architecture work

Tools are needed to assist in the local architecture processes, ones which relate well to the whole and which are capable of functioning across many authorities and suppliers. In recent years, several tools have been developed, but now we need to evaluate the existing support tools and development new tools. These tools can assist in several areas of the architecture process, some of which are used at a highly general and strategic level, whilst others are specific and are aimed at creating a common understanding.

> Guidelines for enterprise architecture work in the form of manuals (so-called "cookbooks")

> Lists and recommendations concerning standards, etc. in the form of the Reference Profile

> A common enterprise architecture dictionary with a list of terms

> A common library of XML tables, web services and architecture documents in the form of the InfoStructureBase (InfoStrukturBasen)

> Examples of official projects which have been carried out in practice, for example in the form of a series of mini-publications called *In Practice*

> Best practice in the form of e.g. The Digitalization Prize

> News providing an overview in the form of OIO news-letters and day-to-day news on *www.oio.dk* and the InfoStructureBase

> Sections for committees and work groups on <u>www.oio.dk</u>, where it is possible to follow work progress

> Templates and guidelines for the preparation of ministerial area IT strategies

In this regard, there is a particular need for the amplification of the Reference Profile. The Reference Profile is a specific, common public tool, which is to be used and supported in connection with the development and expansion of e-govern-ment in Denmark. The Reference Profile contains descriptions of and decisions concerning selected standards, technologies and protocols. Danish work on the Reference Profile is being closely coordinated with corresponding work both under EU auspices and in other countries, which are in the vanguard of e-government development and service-oriented architecture. The Reference Profile should be familiar to public authorities, institutions and companies, and is a *must* for suppliers and consultants.

You can read more about the Reference Profile at <u>www.oio.dk</u>

Suppliers are encouraged to be open and cooperative

In Denmark the market for large, public IT solutions is characterised by the inappropriately small number of suppliers. Moreover, there are few suppliers of solutions, which can be integrated with major systems.

In order to escape this situation, it is necessary to break down market penetration barriers by requiring existing solutions suppliers to use open standards and by ensuring that authorities have free access to their own data. In order to facilitate in this

regard, the Ministry of Science, Technology and Innovation will draw up a series of recommendations for the requirements to which individual public organisations should subject their suppliers.

In future, suppliers must not just only dedicate themselves to selling proprietary data models in a limited market, but they must also expand the market and provide it with coherence and innovative force.

It is important that the knowledge underlying the solutions should not remain with suppliers, but should be released and used in other contexts and new projects. For this reason, purchasers must require suppliers to pass on their knowledge. In order to promote the exchange of experience and collaborate on solutions, the various public authorities should work together both informally and also in more organized forums in order to learn from each others' successes and failures, and to form relationships for future cooperation.

We can learn from each other

One of the important components in the building of a future architecture for e-government is skills/competencies.

We lack a strong tradition when it comes to authorities taking responsibility for some of the architecture tasks, which are of greatest importance to creating IT solutions. In the past, the conduct of analyses of business processes and data and the establishment of requirements and procedures regarding top security, etc has typically been left to the suppliers. Moreover, there has been an increasing tendency to outsource some IT competencies to private suppliers. We have to face the fact that authorities need to (re)build some of the most crucial competencies.

Competencies may be strengthened, e.g. through formal education and training, but just as important is learning by doing, for example through participation in architecture teams and exchanges of experience in user clubs and the like.

Both within public institutions and private companies, great importance is being attached to the benefit of reaping inspiration from those who have gone before, the so-called *best practice* perspective. There are a number of examples of the Ministry of Science, Technology and Innovation cooperating on best practice. One such is the current work - together with LGDK - on clarification of ways to create coherent network solutions, where aims have included the enabling of a collective public network. In addition, together with a number of public and private players, the Ministry of Science, Technology and Innovation has set up the *Digitalization Prize*, which rewards the best digital solutions in the public sector.

The conference was arranged in collaboration with: <