E Government in The Netherlands

An architectural approach

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Some years ago the Dutch government started improving the service level of public agencies. Since then many projects have been started and the first results are apparent. With so many projects being undertaken, it became necessary to implement a programme aimed at developing a reference architecture for Dutch governmental institutions to be able to steer the many different programmes and projects. The first version of the Dutch Government Reference Architecture was published recently. This first draft-document was presented to all the Dutch public institutions, as well as to consultancies and the IT industry. They were all invited to comment on this draft. In the meanwhile programmes and projects are focussing on this first edition of the framework. Interoperability is growing. Co-operation is facilitated and is also expanding. Although the first results are encouraging, there’s a long way to go yet. It can take up to ten years to create a more service oriented public service. This article offers an overview of steps that have been taken in order to develop e government in The Netherlands under architectural guiding principles.

Towards better public services

Citizens and enterprises expect governmental services to be provided in the same manner as those provided by insurance companies. People don’t want to stand in queues at the service desks of public agencies such as municipalities, customs or social security services. Most people like to deal with public sector agencies via the internet or call centres. Moreover, they like to keep their contacts with the public sector to a minimum. They want to interact quickly, via modern communication channels and to receive a high and transparent service level.

Enterprises should develop more sophisticated ways of co-operating with public institutions. These demands did have a moderate effect. During the second half of the 1990s public bodies were challenged to create their own websites. An initiative by several large public agencies to set up a network for data exchange called RINIS, was not very forthcoming. In spite of these developments, real electronic services for public institutions were generally not realized.

In a survey amongst 1,500 people, it was established that Dutch citizens are demanding a different approach by public bodies. These demands are laid down in a so-called ‘e-citizen charter’ (http://www.burger.overheid.nl/actueel/?id=712). This charter consists of quality standards that define the digital relationship between citizens and government (in the fields of information exchange, service delivery and political participation). These standards are formulated as rights to which the citizens are entitled, and corresponding obligations by government bodies. They are in the interests of both the citizens and the government. It allows citizens to call their government to account for the quality of online contacts. The government can use the charter to examine the external quality of e-government. Thus the charter is an instrument to stimulate the further development of e-government from the citizen’s perspective.
This code comprises 10 standards for the functioning of Dutch public bodies, for example:

- Transparent Public Sector
- Personalised Information
- Choice of Channel
- Comprehensive Procedures
- Convenient Services

All the Dutch industrial sectors are also represented. They would like to have a public service that produces less red tape, fewer regulations and less procedural complexity. They aspire to reduce administrative costs by some 25%.

The demands from the citizens as well as the companies emanated in a new governmental programme of action, which can be paraphrased as ‘Different Government’ (http://www.minbzk.nl/uk/different_government/introduction). The results of this programme should be the origin of a modern, transparent and highly effective way of governing the state, the provinces and the municipalities. So in 2003, the Dutch government decided to launch this new programme aimed at the growth of e-government and covering the entire public sector: Ministries, Provinces, Municipalities, Water Boards and many agencies in different sectors, like social security, the tax department, education and health care. The main goals of this ongoing programme are:

- Higher quality of service;
- Less red tape and regulations;
- A more comprehensive government policy;
- More cross-flowing public co-operation.

Several sub-programmes were developed. One of them was called ‘electronic-government’ or ‘e-government’, which stands for: A more comprehensive approach in the use of modern information technology supporting the goals of the “Different Government” programme.

The e-government programme includes more substantive goals, some of which are:

- 65% of the public services being available via the internet by the end of 2007 (for measuring methods see: http://www.minbzk.nl/contents/pages/65347/monitor.pdf);
- Data that is used by many public bodies, like data concerning citizens, companies, buildings, addresses and incomes will be registered centrally and be used by official agencies when necessary;
- Every citizen and every company will have an unique, electronic identity which will be used for identification and authorization purposes in public, electronic communications.

Many projects were started on a national level. To mention but a few:

- The development of national registries;
- The development of sophisticated, comprehensive, service oriented websites for citizens and companies;
- The introduction of an unique citizen service number, to connect many registrations;
- The introduction of an unique number for companies, non-profit organizations and government institutions, to connect many registrations;
- The introduction of a national authentication service;
- The development of a mechanism for electronic forms and the way they are processed in many back offices;
- The development of a mechanism for a personal citizen internet page, “my government”, which combines personal information from many agencies and offers personal assistance in contacts with public bodies.
A knowledge centre was established for the dissemination of information about the progress of e-government initiatives, good practices and information about ongoing projects. Programmes were set up for municipalities and provinces to stimulate the adoption of the e-government aims. These programmes were recently expanded with so-called ‘implementation teams’. These teams offer assistance to public bodies in developing project plans and the transferring of specific knowledge.

In addition to these national programmes, sectoral and regional projects were also started, as well as projects which focus on municipalities, Water Boards, provinces and government agencies. In total: hundreds of projects, with a total budget of several hundred million euro.

Due to this growing number of national, sectoral and regional projects, some stakeholders became aware of the necessity of architectural guidance. The need for an interoperable framework and standards became more evident. This idea initiated a new programme: ‘e-government architecture’.

The Dutch Public Architectural Framework

In 2001 a new foundation was established: ICTU, which stands for ICT executive organization (http://www.ictu.nl/profile.html). Since then, the execution of the first e-government programmes, many of them as previously mentioned and founded by various ministries, were merged within this foundation.

In 2002, the Ministry of the Interior assigned three professors to develop a meta-architectural framework. Naturally they used existing frameworks, like the Sachman framework and in addition to this, they organised some workshops for architects from different governmental bodies. This resulted in a meta-framework, which includes traces of ‘Sachman’, but which is less elaborate and more importantly, accepted by some 25 architects. This meta-framework is presented in figure 1 (Dutch report available on: http://www.minbzk.nl/ict_en_de_overheid/publieke/inspringthema_s/ict_architectuur).

![Original architecture meta-model](image_url)

Figure 1 Original architecture meta-model

The ‘e-government architecture programme’ was started in 2003. The results of this programme are published (mainly in Dutch) on www.e-overheid.nl/atlas. After a relatively lengthy initial period, a small group of architects started working on the development of the Dutch Government Reference Architecture. In order to prevent time-consuming discussions about meta-architecture frameworks – almost inevitable when working with groups of architects – it was decided to use the above-mentioned meta-model as a basis for the public reference architecture.

Basically the reference architecture rested on two pillars: the first one was formed by the architectural choices that had been made by the programmes within ICTU that would have a
serious impact on the final architecture of the Dutch e-government. Among them: programmes on the development of national registrations, those on e-security and the development of open standards. The second pillar was formed by the influence of some major government agencies, like the national social security agencies. Architects from these programmes and agencies have had a major influence on the emergence of the initial draft of the Dutch Government Reference Architecture (Dutch abbreviation: NORA).

After a while, more and more architects from different programmes and governmental organizations took part in the discussions about the main architectural principals and models. In this way, a more robust version of the framework developed and was published in May 2006.

Position and function

The aim of developing a reference architecture was to create common ground for the multitude of architects that are working on the development of the e-government targets. The idea is that architects have a profound influence on the construction principles of e-government. From their respective positions in projects and institutions they could take care of the necessary coherence between the many aspects of e-government: websites, data storage, process flow, semantics, data communication, messages, preferred technology, and so on. Architects have to play a role in the set-up of projects and business solutions. They have to advise programme and project managers about construction principles. Architects have to play a role in giving instructions to business process analysts and software developers. Architecture may even play an important role in auditing project progress in setting standards for the results that have to be achieved.

As shown in figure 2, the idea of a reference architecture is, that this set of construction principles and explanatory models helps architects in various ways to create dedicated architecture for specific business solutions. In this way, one can see a hierarchical set of architectural frameworks, ranging from international frameworks, via national and sectoral frameworks to enterprise architecture. Just like the famous Russian matryoshka dolls where the smaller one fits into the larger one.
Contents

One of the most fundamental architectural principles adopted as a design basis, was the service oriented architecture. Not only in the narrow sense of the word, i.e. the service as a self-contained software module that performs a certain function, but also in a broader sense, whereby every form of service between a governmental body and a citizen or a company is regarded as a service. The way that two or more governmental bodies work together is seen as a service relationship. So too is the cooperation between two or more departments at a single institution based on this service oriented architecture. This deliberate choice appeared to be fundamental for many other architectural decisions.

One of the initial consequences of the service orientation was that the chosen meta-framework had to be adjusted. Figure 4 Shows that the service has been entered in the original meta-framework. This adjusted meta-framework was used to develop a coherent set of construction principles for e-government.

As mentioned before, demands from citizens and companies played a dominant role in the idea of what e-government should be. Hence their demands had to be translated into architectural

Figure 3 Hierarchy of architectural principles

Figure 4 Revised architectural framework
principles. Other influences came about from the previously mentioned programmes and agencies working on e-government. However, international frameworks like IDABC’s ‘European Interoperability Framework’ were also used to develop the contents of the Dutch Government Reference Architecture (http://europa.eu.int/idabc/en/document/3761). The combination of these inputs formed the basis of the initial draft of the NORA. In future developments, the NORA will be improved by comparing documents from other countries, as mentioned in table 1.

<table>
<thead>
<tr>
<th>Country</th>
<th>Reference document</th>
<th>Source</th>
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<tbody>
<tr>
<td>Austria</td>
<td>Administration on the net – An ABC guide to E-Government in Austria</td>
<td><a href="http://www.cio.gv.at/egovernment/umbrella/Administration_on_the_Net.zip">http://www.cio.gv.at/egovernment/umbrella/Administration_on_the_Net.zip</a></td>
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Table 1 Some architectural references, standards and frameworks

Each cell of the revised architectural framework is filled with 10 to 20 architectural principles. They are preceded by a short introduction of the specific architectural issue, for example, the section about data communication or the one about process architecture. Every principle is noted as a short statement, which is immediately followed by a more detailed explanation. Finally, every principle has a status identification. Some principles could be derived directly from legislation; these principles are called ‘de jure principles’. Others could be based on good or common practices. These are the ‘de facto principles’. The de jure and de facto principles are all applicable to the co-operation between different governmental bodies. For governmental institutions it will become more and more difficult to ignore these types of architectural principles. On the other hand, there are principles that only effect the internal architecture of a governmental body. These types of principles are seen as ‘advisory’. There are two reasons for the adoption of these advices in the NORA: if the internal architecture is compliant with these advices, interoperability should be relatively easy. The second reason stems from the fact that smaller governmental bodies, such as small municipalities, have a problematic lack of know-how on architectural topics. In this respect the Dutch Government Reference Architecture serves as a body of knowledge for less experienced architects.

It would be cumbersome to discuss all the architectural principles as set out in the NORA, in this article. The document contains 150 pages. A glimpse through the appendix would at least give a slight impression of the topics which are dealt with in the NORA.

As mentioned previously, this version of the NORA still has a draft status. Comments from public agencies and the industry will be used to develop a more robust version of the NORA, which will be published in Q4 2006.

**Action for implementation**

One of the first steps in the development of the framework, was to develop high level models of the most important components of the e-government architecture. In these so-called
‘overview maps’, relevant items like national databases, a national infrastructure, the various institutions and the common front office channels were visualized. Figure 5 shows the result of this approach. The symbols of both the citizen and the company are quite important as a focal point and a reminder of the fact that every step and every action is devoted to these two factors.

Figure 5 Overview of Dutch e government architecture

In the same way, additional overview maps were developed for more specific areas of the most general overview map, in order to give further detail of underlying structures. For example figure 6: this picture shows the design of a hierarchical composition of European, Dutch, sectoral and even enterprise service busses (not visible), based on existing busses, but merged and completed in an infrastructural architecture. In The Netherlands nowadays, several parties are developing networks and service busses based on this relatively simple architectural design.

Figure 6 The infrastructure: a hierarchy of networks and service busses

So the relevant function of these overview maps is to facilitate the discussions about the main architectural issues. This applies not only to the discussions amongst architects, but moreover to the discussions between government officials and programme managers on the one hand, and architects on the other hand. Overview maps bridge the alignment gap between ‘business’ and ‘builders’.
A second important line of action is the development of common building blocks of the e-government architecture. Some of the most important are:

- A national e-government portal for citizens
- A national e-government portal for companies
- A national call centre for the Dutch public sector
- An unique personal number
- An unique number for companies and institutions
- A national service for authentication, in three forms: user ID + password; user ID + password + short message service; and based on public key infrastructure.
- A new smart-card based on a national identity card, which contains biometrical data
- The development of a national repository for all public services and products
- The development of a national mechanism providing and handling web forms
- The development of national registries
- The development of a national infrastructure for the exchange of messages and services

These types of standard components of e-government will more and more play a dominant role in the development of a comprehensive e-government. They will help to overcome interoperability problems and they will bring about a more transparent design and a better functioning public sector.

**Some initial results**

The development of a comprehensive e-government is a step-by-step process. If one looks back to the situation at the turn of the millennium, the big issue then was to overcome the millennium bug: all systems had to be adjusted to make them millennium-proof. In those days many governmental institutions were working on their first website. The number of internal systems were growing. The architectural function was poorly developed. Co-operation between institutions was not a very hot topic. Citizens and companies asked for ‘one-stop-shopping’ and less red tape. This striving for a more modern, service oriented government, gradually became a more dominant issue on the political agenda, both on a national and a regional level. Some organisations, like the Tax & Customs Administration and the Informatiebeheergroep (student grants), took their first measures to develop services via the internet and modern call centres.

When we look back at 2005/06, we see a rapid growth of e-government. Every public body is represented on the internet. 80% of the municipalities have an actual presentation of relevant policy issues. 55% of them have realized electronic services on their websites. About 4 months after launching the national authentication service, more than 1 million citizens have an own unique, classified password for transactions with dozens of governmental institutions. Many governmental bodies have their first web-forms in place, partly interfaced with computerized back office fulfilment. There is a national data collection point for standard data deliveries from companies to several public bodies, like the Tax Administration, the Social Security Administration and the Statistics Office. Tens of millions of messages are transported between public bodies every year via various linked secure networks. We know that many projects are ongoing, so the number of results will grow rapidly. Thus the number of architects in the public sector is growing too, because it’s clear that, the more the co-operation and the number of services is growing, the more the complexity of secure information handling grows. This growing complexity triggers a more dominant role for enterprises and information architects.

**The years to come**

In the next 5 or 6 years, the development will continue; probably accelerated. The availability of dominant national registers for people, addresses, companies, buildings, wages, pensions
and the like, will create a great opportunity for almost every governmental body to drastically redesign their service processes. It will create splendid opportunities for pro-active services, quicker responses, less mistakes and less fraud. Projects will be carried out to harmonize data definitions, to integrate networks, to develop sectoral and national service busses, to harmonize meta-data, to set up a national governmental call centre and to develop many more electronic services. A dramatic improvement of the e-government idea. The goals formulated at the beginning of this decade, will be met.

Architects have to accept the challenge. There's a great deal of work to do. Without sound architectural craftwork, the great endeavour will become a drama. Close co-operation between authorities and their staff, including architects and information managers, is a vital necessity.

The Dutch Government Reference Architecture will be completed and improved. The dissemination of it’s contents has begun. For the national programmes there are close contacts with intermediary organizations for all the different public bodies: ministries, provinces, municipalities, Water Boards, agencies, e-government programmes, consultants and the IT industry. Meetings, seminars and conferences are held to analyze the architectural principles and models. These intermediary organizations are asked to make a more specific ‘translation’ of the NORA for their own public sector. Some already have; others are still working on it. In a growing number of cases, the reference architecture was used to set out the principles for new, common or specific components of e-government. So they used the NORA to develop project architecture. By doing so, the results of various projects will match up when they are implemented. The NORA also plays an increasing role in the setting of standards and is helping organizations to make a sound choice in the tremendous amount of technical solutions. Publications via the internet and professional periodicals help to spread the principles, standards and preferred solutions. The educational system will perhaps also be used for spreading the architectural views and to improve the professional standards.

What will be the next step? Probably a more active co-operation on an European level. Too many architectural issues are similar in different countries. Knowledge must be shared. Yet architectural solutions must also be developed for the growing co-operation between national governmental institutions. As time passes, e-government will become a pan-EU issue which needs to be addressed. Let’s be sure that architects from the EU countries are ready for this next endeavour.

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References


Appendix

Overview of main principles, arranged according to the cells of the NORA architectural meta-model.

Organization Architecture

- Governmental organizations are sovereign.
- Governmental organizations formulate core functions.
- Governmental organizations co-operate, both horizontally as well as vertically.
- Service orientation is a leading principle for governmental organizations.
- Organization-design supports multi-channel front offices.
- Co-operation between organizations on the basis of SOA.

Business Services Architecture

- Organizations provide individual and combined services to their clients.
- No wrong door: every starting point for governmental contact is OK.
- Multi-channel service delivery.
- Customer chooses preference channel; organization entices customers to best channel.
- Channel harmonization is essential.
- Pro-active services: Customers are pointed towards the relevant business services.
- Business services can be a combination of underlying internal services.
- Electronic identification, authentication and authorization are essential.

Process Architecture

- Business processes produce services.
- Business processes correspond to the services.
- The customer is the starting and delivery point for services and process design.
- The steering of the chain process is done by the organization ending in customer contact.
- Work processes are accomplished by both employees and servers.
- Processes are automated unless this is not possible.
- Customer can see work in progress (tracking and tracing).

Application Architecture

- Applications serve only one functional domain inside an organization.
- Applications serve only one organization.
- Organizations correspond to the services.
- Applications (and employees) fulfil processes; process management (BPM) and data storage are separated from work processes.
- Employees use “computer assisted case handling” software (WFM).
- Both Workflow software and (unattended) applications work are controlled by business process management software.
• Front office channels can be linked at a local, sectoral and national level.

**Data & Messages**

• Data is standardised.
• Single point of control for data management; National registries are leading.
• We ask for data once and use them in many situations.
• Messaging standard: ebMS and web-services.
• Received data and documents are enriched with meta-data and archived.
• Distinguish contents and process data.
• Distinguish property, management and use of common data.
• Quality of data registered and locked in administrative appointments.

**Information exchange**

• Organizations correspond to (sectoral) busses.
• The connection from organizations with a (sectoral) bus is done via a BPM application.
• Services/data and files are exchanged in a hierarchy of service busses.
• Standardization of protocols (ebXML, web-services, messages, file-transfer).
• Infrastructure is highly available.
• Thrive for straight through processing.

**Technical Components Architecture**

• Freedom of choice for an organization (subsidiarity principle).
• High reliability of mission critical systems.

**Data Storage**

• National Registries are leading.
• Appropriate reuse of data.
• Standardized technical data model, independent of work processes as far as possible.
• Separation of data and documents.
• Preference for structured data instead of electronic documents.

**Network Architecture**

• Data transportation G-to-G within a protected network.
• Communication with citizens and companies about (protected) internet.
• Organizations correspond to a single gateway (incl. firewalls, intrusion detection, virus-scanning, etc.).
• The dynamics is a starting point for the sizing.
• Standard exchange protocols, preferably TCP/IP.