

Business Process Improvement in Organizational Design of e-Government Services

Ömer Faruk Aydinli¹, Sjaak Brinkkemper² and Pascal Ravesteyn³

¹Logica, Public Sector, Arnhem, The Netherlands

²Institute of Information and Computer Sciences, University of Utrecht, The Netherlands

³Research Centre for Process Innovation, University of Applied Sciences Utrecht, The Netherlands

omer.aydinli@logica.com

S.Brinkkemper@cs.uu.nl

pascal.ravesteijn@hu.nl

Abstract: This paper describes a business process and organizational re-design and implementation project for an e-government service organization. In this project the initial process execution time of a Virtual Private Network (VPN) connection request has been reduced from some 60 days to two days. This has been achieved by the use of a new business process reengineering (BPR) implementation approach that was developed by the Utrecht University. The implementation approach is based on a combination of Enterprise Information Architecture (EIA), Business Process Modeling (BPM), Knowledge Management and Management Control methodologies and techniques. The method has been applied to improve the performance of a Dutch e-government service department (DeGSD). DeGSD is an e-government service department that supports and promotes electronic communication. It can be described as an electronic mail office for consumers that provides the ICT infrastructure to communicate with the government. The goal is to reduce administrative activities for both the government and consumers. Supporting technology and part of the process is outsourced. In our approach we used EIA as a starting point because it describes all relations and information exchange with all stakeholders. This is different compared to more traditional approaches which tend to have a main focus on the internal processes (when it comes to automation) whereas our approach aligns the processes and systems across different participants, such as suppliers and customers, in the supply chain. Also included in the implementation approach are management control design mechanisms to ensure that the organizations strategy is in sync with its processes and activities that are performed by the employees. Management control is crucial in enabling the continuous measuring and improving of the organizational performance. Although the proposed BPR implementation approach worked in the project at DeGSD, further validation is necessary. Therefore we suggest that more case studies are performed at both government and profit organizations.

Keywords: business process improvement, organizational (re-)design, business process reengineering, enterprise information architecture, knowledge management, e-government services

1. Process design for e-government service departments

During the past decade we have seen that more and more governments in the world are providing their services via information and communication technology (ICT). Governments wish to improve the services they provide to citizens and companies by using the options offered by ICT. In this paper we use the following definition for Electronic government (e-government) services:

“Government activities that take place by digital processes over a computer network, usually the Internet, between the government and members of the public and parties in the private sector, in particular governmental organizations. These activities generally involve the electronic exchange of information to acquire or provide products or services, to place or receive orders, to provide or obtain information, or to complete financial transactions” (MoMS 2004).

E-government services reduce operating costs and provide direct communications between citizens, companies and governmental organizations. To provide these ICT services new governmental departments are being set up. They are responsible for the communication between governmental organizations and both citizens and companies in a secure way. These departments have a portal function. They are providing digital signatures to citizens for authentication and they set up VPN connections between companies and governmental systems to enable exchanging information in a secure way.

DeGSD is such an e-government service department that supports and promotes electronic communication. It can be described as an electronic mail office for consumers that provide the ICT infrastructure to communicate with the government. The goal is to reduce administrative activities for both the government and consumers.

The department has been set up in 2005. In the first year several pilot projects were set up for service delivery. During these projects the organization discovered that connecting to other companies turned out to be very problematic. This was caused by a lack of process governance, bad communication with the customer and non-controlled knowledge transfer from the initial system developers to the operational staff. Therefore it was decided to redesign the process. This decision was based on recent research in the government domain (Martin and Montagna 2006), which suggests that before implementing an e-government strategy the back office processes should first be changed with the help of BPR.

Ever since the start of the business process reengineering movement (Davenport and Short 1990; Hammer and Champy 2001) the success has been debated (Zairi 1997; Teng, Jeong and Grover 1998). Many implementation methods or principles have been proposed (Harrington 1995; Armistead 1996; Burlton 2001; Chang 2006) in which the essence stays the same (Kettinger, Teng and Guha 1997). All proposed methodologies have an envision phase in which management should acknowledge the need for change. This is followed by the initiation of a project that starts with diagnosing or analyzing the existing processes after which suggestions for redesign are made. Finally the changed processes should be implemented and evaluated against a set of performance measurements. So to help solve the problems facing the e-government service department DeGSD in the implementation phase of their e-strategy a new approach was developed consisting of the following six phases:

- Map the EIA the department by using Enterprise Architecture Modelling (EAM)
- Choose a strategy discipline
- Define the primary processes of the department by using business process modelling (Primary processes have to be in line with the chosen strategy discipline)
- Optimize processes
- Choose a knowledge management strategy and implement a tool and procedures that are in line with the chosen strategy
- Define and implement controlling mechanisms for the all departments that are involved

The remainder of the article is as follows: in section 2 a detailed description of the project phases is given, then in section 3 the improvement project executed at DeGSD is elaborated upon after which conclusions will be drawn and discussed in section 4.

2. Organizational designing of e-government services

The developed approach as described earlier consists of six phases that are described further in the following subsections.

2.1 EIA

Decisions made by managers have an important effect on the communication processes between citizens and the government. Wrong decisions can have a big impact on the functioning of the government. Regulations and security issues are also very important.

To provide proper information to politicians and managers who are responsible for the e-government services, enterprise information architecture is a useful tool, because the main benefit of enterprise information architecture lies in its holistic approach of all aspects of the enterprise. (Koning, Bos and Brinkkemper 2008) This includes the ICT infrastructure and procedures, the business related issues, like business process or business excellence and the internal and external information exchanges. EIA deals with the documentation, communication, legal aspects and decision making of the complete information infrastructure of an enterprise.

With regard to this subject, the information which is the most critical for managers to decide includes 1) Mission, vision and strategy 2) Enterprise context 3) Enterprise functions 4) Information and

communication systems and 5) IT infrastructure (Koning, Bos and Brinkkemper 2008). EAM is a method for creating enterprise information architectures. The process of creating an information architecture by using the EAM modeling technique consists of the following steps: (Koning, Bos and Brinkkemper 2008)

- Create a supply chain diagram (SCD)
- Create an enterprise function diagram (EFD)
- Create application and scenario overlays
- Create a system infrastructure diagram

2.2 Strategy discipline

A strategy discipline defines the main focus of an enterprise and therefore influences design decisions when developing a business process. In this project the company chose the value discipline model of Treacy and Wiersma (1995) as strategic discipline, but other disciplines can be chosen as well. This depends on the environment and situational factors of the enterprise. The value discipline model can make the direction of the organization clear to employees so that they can act in line with the wishes of the organization. Treacy and Wiersma describe three generic value disciplines. Any organization can choose one of these value disciplines and consistently act upon it. The primary processes of an organization have to be in line with the chosen value discipline. The three value disciplines according to Treacy and Wiersma (1995) are:

Operational excellence: Company excels in superb operations and executions. The focus is often on providing products and services with a reasonable quality at a low price. There is a task-oriented vision towards staff. The main focus is on efficiency, streamlined operations, supply chain management and high volume. There is a limited variation in product sets.

Product Leadership: Company excels in innovation and brand marketing. The focus is on development, innovation, design, time to market and high margins.

Customer Intimacy: Company excels in customer attention and customer service. It tailors its products and services to individual customers. There is a large variation in products and services. The main focus is on customer relationship management.

2.3 Defining primary processes

BPM is the discipline of defining and outlining business practices, processes, information flows, data stores and systems. (Sparx 2007) BPM is an important part of understanding and (re-)structuring the activities and information flows within an organization. The emphasis of BPM is on how the work is done within an organization. It is an important tool in understanding the activities an organization undertakes and the kind of information it needs to successfully engage in those activities (Sparx 2007). There are numerous business process modeling techniques developed in the last decade. Some examples of these techniques are Petri Nets, Event-driven Process Chains, Workflow Nets, Unified Modeling Language (UML) and Business Process Modeling Notation (Weske 2007). These techniques are based on different views on processes. Some aim at modeling processes from an IT perspective (such as UML), while others are based on a business perspective. In the project we used elements from both UML and Testbed (Telematica Institute) to satisfy both the IT and business stakeholders involved in this project. One of the main goals of modeling the business processes is to create transparency in how the work is currently done (as-is situation) within an organization. This is also the basis for the process analysis in the optimization phase.

Based on the analysis the e-government service department can define a set of standard processes that describes how to perform the departments' services in the future (to-be situation). These standard processes are used to establish consistency across the organization. The chosen value discipline is an important factor when (re-)designing the primary processes. For example, if an organization chooses product leadership instead of the operational excellence discipline there will probably be more quality control mechanisms required in the primary processes.

2.4 Optimize processes

Optimization is the use of specific techniques to determine the most cost effective and efficient solution to a problem or a process. Process optimization is the practice of making changes or adjustments to a process to get better results. (Ranjit 2001) Although process optimization is part of BPM and has therefore received much attention in industrial engineering and management literature, there is not much known on how to use these concepts in the public sector. Gullidge and Sommer (2002) have done research on how to implement BPM in the public sector and state that among the most important activities are documenting the existing processes, managing the process (measuring and optimizing performance) and improving the process to optimize the product/service quality. This is also in accordance with the 'streamlining the process' and 'continuous improvement' phases of the Process Breakthrough Methodology that is developed by Harrington (1995). In these phases processes are continuously optimized by redesigning them, for this purpose it is important to benchmark processes, perform risk analysis and measure improvements in terms of costs and time.

The main goal of process optimization is to resolve complex challenges and improve product, service, process and business performance and this is supported by Bhatt and Troutt (2005), who have found that business process improvement initiatives directly affect customer responsiveness and product/service innovation.

e-Government services that choose the operational excellence value discipline have to optimize their processes to serve customers in an efficient and cost effective way.

In order to achieve the major goals of business process improvement, managers need to fully understand the cost, time, and quality of activities performed by employees throughout an entire organization. A method for understanding the costs structure of processes is Activity Based Costing (ABC). After defining the primary processes, the most costly parts can be identified by the ABC method. Then these parts can be improved by eliminating redundant or irrelevant activities or automation.

2.5 Knowledge management

Michael JD Sutton (2003) defined a list of reasons why an organization should implement knowledge management to gain advantage. Stan Garfield (2006) described a set of goals and benefits in order to create added value with knowledge management. Some examples of these benefits are:

- Avoid redundant effort by using knowledge management systems.
- Make it easy for employees to find the necessary information and resources to do their jobs.
- Communicate important information widely and quickly in the organization.
- Capture key information on all work performed so that everyone will know what others have done and who to contact for further details.
- Provide and create methods, tools, templates, examples and data to streamline business and services.

In sections 2.1 and 2.3 we described the business processes where knowledge creation takes place. By identifying these business processes and understanding them, we can describe information architectures, business process models and working procedures. It also enables us to describe the roles and functions of the employees including the knowledge and experience needed to execute these. This knowledge and experience has to be shared and (re-)applied within the organization to provide services in an efficient and controlled way. Furthermore the knowledge and experience has to be evaluated periodically and adapted if necessary. Knowledge management is a continuous process (Weggeman 1997) that needs to be managed. This can be done via a knowledge management strategy (KMS). There are two types of KMS described by Jashapara (2004). First there is codification, which is based on technology and use databases to codify and store knowledge. It is heavily based on codifying explicit knowledge. Second is personalization, which is less about technology and more about people. It is heavily based on tacit knowledge.

For small organizations often one KMS can be selected. Before an organization chooses a KMS the properties of the organization have to be identified. Hansen, Nohria and Tierney (1999) provide a list of questions to help guide an organization in establishing a KMS. By answering these questions the

various properties of the organization will be established. Thus enabling the organization to formulate or choose a better KMS based upon these properties. The questions are:

- 1) Do we offer standardized or customized products/services? E-government services are standardized. They are not customized for a special group.
- 2) Do we have mature or innovative product/services? E-government services are mature.
- 3) Do our employees rely on explicit or tacit knowledge to solve problems? In most situations employees of an e-government service organization use explicit knowledge to solve problems or provide services. This kind of knowledge can also be codified.

Because of the properties of the service that is provided by the e-government services, a codification strategy seems right. Therefore the e-government services have to develop or buy an electronic document system that codifies, stores, disseminates, and allows reuse of knowledge. (Hansen et.al. 1999). They of course also have to develop and implement associating working procedures.

2.6 Controlling mechanisms

In organizations management control is one of the most critical functions; it involves managers taking steps to help ensure that the employees do their work according to the best interests of the organization. "Management controls are necessary to guard against the possibilities that people will do something the organization does not want them to do or fail to do something they should do" (Merchant and van der Stede 2003). Besides this the management control issue has also become more important because of various scandals like Enron, WorldCom and Ahold. These scandals triggered governments and institutions to create laws and rules concerning corporate governance.

The laws and rules that have been designed and implemented requires organizations to improve the alignment between governance, risk management and compliance (Brown and Nasuti 2005; Drew 2007; Elgar 2006).

This aspect is very important for e-government service departments. Mistakes made by employees during execution of processes or activities can have large impact on the reliable functioning of the government. Therefore e-government service departments have to minimize the chances that mistakes can occur. There are three types of control described by Merchant and van der Stede (2003). The first is result control; this involves rewarding individuals for generating good results, while bad results are penalized. Result control influences the actions of employees because they motivate employees to be concerned about the consequences of the activities they perform. "The organization does not dictate to employees what actions they should take; instead employees are empowered to take those actions of which they believe that it will produce the desired result" (Merchant and van der Stede 2003).

Results should be measured precisely and objectively in order to be able to control and improve activities and actions of employees. A second type of control is action control. This "control ensures that employees perform (or do not perform) certain actions known to be beneficial (or harmful) to the organization. It is important to define what actions are acceptable or unacceptable, to communicate those definitions to employees and to observe or otherwise track what happens and reward good actions and punish those that deviate from the standard set" (Merchant and van der Stede 2003). The last control is personnel control which builds on employee's natural expectancy to be controlled and motivated in an organizational environment. Three major methods of implementing personnel controls are: selection and placement of employees, training and job design.

3. Project execution at DeGSD

In the first year after the set-up of DeGSD, several pilot projects for electronic service delivery were initiated. The development of technical facilities was outsourced to specialized ICT companies. The main function of the DeGSD department was managing the outsourcing and implementation processes and after implementation providing the service to the public. A year later when some pilot projects were finished and the government decided to make them operational some organizational problems occurred:

- The operational environment and scale differed significantly from the pilot projects.

- The technical ICT product can be innovative and well engineered, but if the organizational structure is poorly designed (no working procedures, staff not well trained, etc.), then the resulting service to the end-user will be very problematic.
- and because of these operational problems, citizens and companies were reluctant to use the new electronic services.

The aim of the improvement project was to analyze and understand these operational issues and to propose and implement possible solutions, based on the new BPR method as discussed in the section 2. One of the pilot projects was the set-up of VPN connections between companies, governmental institutes and DeGSD. The way in which VPN connections are setup is illustrated in figure 1.

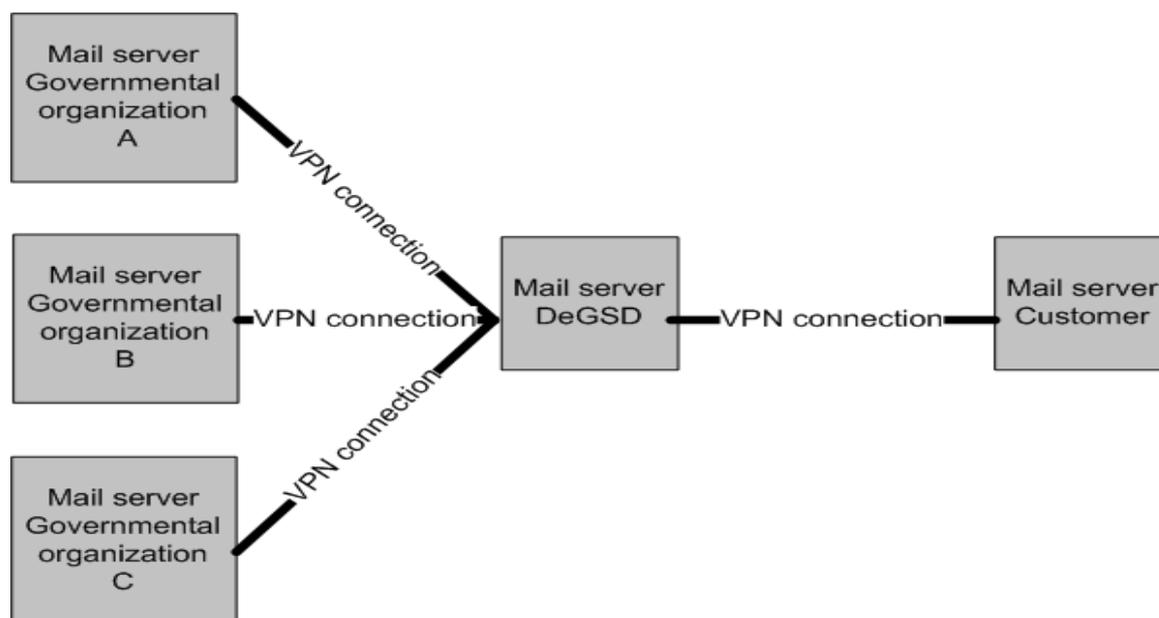


Figure 1: Communication model DeGSD

The first message is sent by the requesting company via a VPN connection to the server of DeGSD and then DeGSD forwards it to the addressed governmental institute. By sending messages to the DeGSD server, the company will be authenticated automatically. If it is an unknown company or the company has no permission to communicate with the governmental organization, the message will not be forwarded. There are special requirements for the format type of the message. The mail-server software of the company has to generate and support this format.

The steps in the connection process are as follows:

- A company (customer) sends a requests for connection to DeGSD.
- DeGSD requests to their outsourcing partner (KPN an incumbent Telco) to set up a VPN connection between the server of DeGSD and the server of the customer. To do this KPN contacts the customer and sets up a VPN connection.
- DeGSD and the customer will test the connection.
- The governmental organization and the customer will test the message mark-up and format.
- The customer runs the first production (e.g. information exchange).

The outsourcing and implementation process of this VPN connection project was successfully finished. But when management decided to go live, too many requests for connection came from companies and governmental institutes and DeGSD discovered that the organization was not designed well enough to handle these numbers of requests in an efficient way. The major problems were:

- The process on how to set up a VPN connection with DeGSD was not described in detail. The technical criteria were vaguely formulated. The helpdesk received many questions and problems when companies where trying to set up VPN connections.

- The functional administrators who were responsible for the connection process were not well trained.
- It was not clear to employees who was responsible for what (governance problem).
- The registration process for functional administrators was very inefficient. The time spent in registration was sometimes more than in connecting companies.
- ICT specialists and consultants who were hired in the outsourcing and development phase left the organization. The knowledge transfer from them to functional administrators was not managed well.
- It was not clear to employees and managers what the direction and strategy of the organization was.
- It sometimes took 2 months for companies to set up a VPN connection, which obviously caused a lot of frustration.
- The cooperation with DeGSD and governmental organizations was not optimal. There was disappointment because of the connection problems.
- There was a need for formal procedures between DeGSD and the governmental organizations.

To solve the different problems it was decided to redesign the business process. The first phase in the developed BPR approach was to develop an EIA for the organization. The goal was to:

- Identify all parties the organization has relations with.
- Identify the type of information exchange between external and internal parties.
- Identify who is responsible for which processes.
- Identify all applications and tools used in the organization.

The SCD of the organization identifies all parties with whom the organization has a relation and it visualizes the kind of information exchange between the different parties (see figure 2).

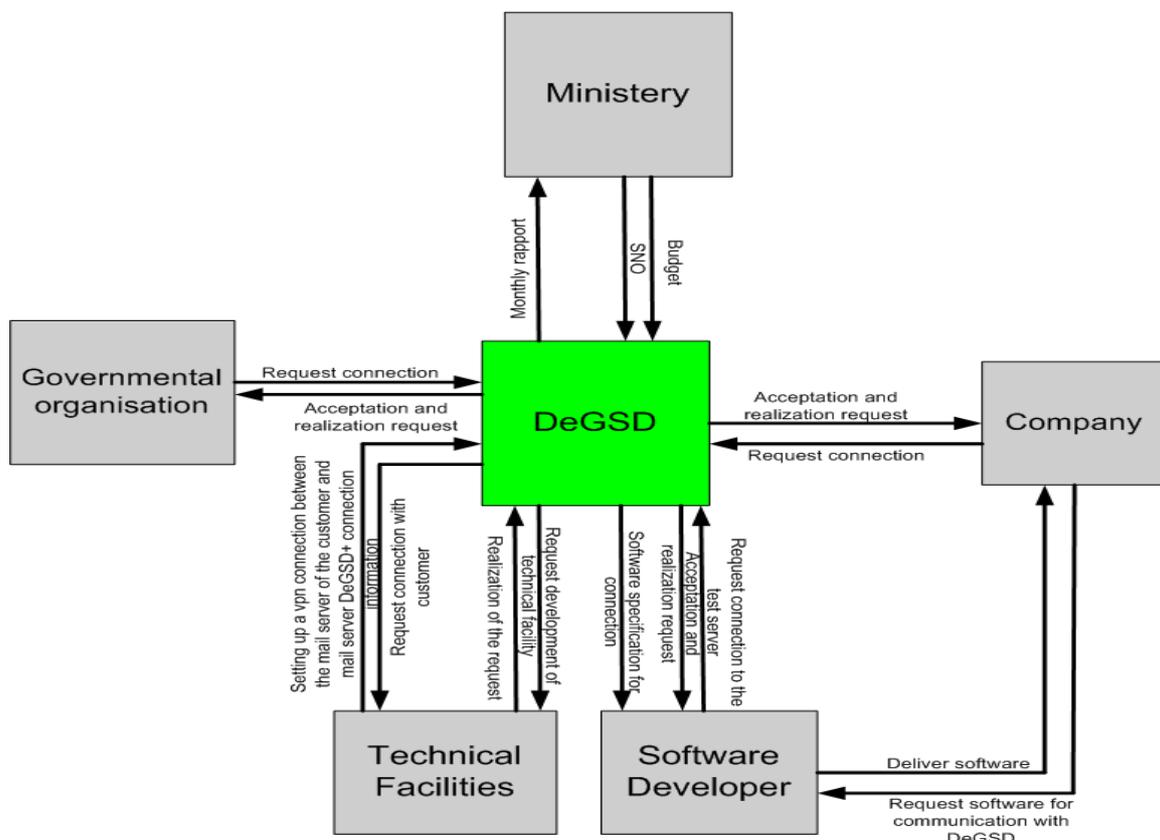


Figure 2: Supply chain diagram DeGSD

Then an EFD was developed to identify the responsibilities pertaining to the various parts of the connection process. The hierarchical ordering of EFD shows managers the departments and activities

under their supervision. By applying an application overlay it is possible to identify all applications and tools used in an organization. Based on the application overlay it was detected that some applications and tools had the same function, so management decided to remove redundant applications.

The EIA was used to visualize how the organization was functioning and to address the responsibility problem in the organization.

The next phase was choosing a strategy discipline to get a clear sense of direction within the organization. As stated before DeGSD used the value disciplines model of Treacy and Wiersma. The best value discipline in this model for e-government service departments is operational excellence. The service that e-government organizations provide is not tailored but standardized and the main focus is on efficiency, also the volume of provided services is high.

The EIA and the decision for operational excellence were explained to employees by means of presentations to make clear in which direction the organization would go and how the organization was going to function. By having a clear strategy and involving employees there was already a slight improvement in performance, mostly because employees came with suggestions on how to improve processes to achieve the operational excellence strategy. Although EIA and the chosen value discipline already improved the performance of the processes, the connection time was still 6 weeks and it was still not clear for companies how the connection process worked. There was a need for a detailed process description. In phase 3 of the BPR approach the connection process and what is needed to setup a VPN connection was described and visualized in detail by using business process modeling techniques. When a new request for a VPN connection was received, the functional administrators sent the requesting company first the diagrams in which the connection process was explained. Questions about the connection process from companies promptly decreased. In figure 3 the initial situation (before optimization) of the connection process is depicted.

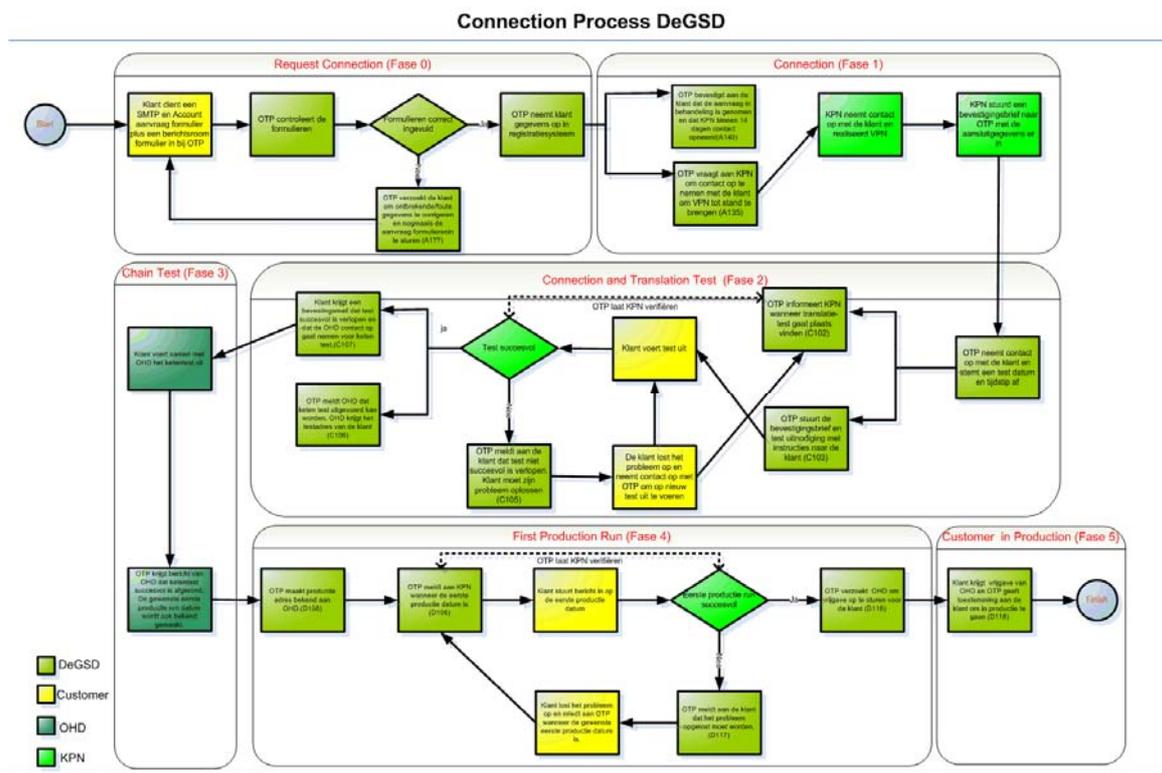


Figure 3: Business process model DeGSD before optimization

Once the as-is connection processes were described it was clear that it had to be optimized. There were steps in the process that were needed in the pilot phase to test the applications but which were no longer needed in the operational phase. Other processes were still done manually although they could be automated. Management decided to automate and optimize the most costly parts of the processes based on the information that was visualized by the developed model. The costs per phase were determined by using the ABC method. It turned out that the two test phases were the most expensive part of the connection process. A test-robot was developed to enable customers testing the connection process and message format in an automated way. Also new outsourcing agreements

were made with KPN to setup VPN connections in a faster way. After the optimization the connection time was decreased to two days. Figure 4 shows the new process that consists of less phases, sub processes and activities.

The knowledge that was created by developing the EIA, process models and descriptions had to be shared and applied throughout the organization. In phase 5 of the BPR approach management chose for the codification knowledge management strategy. Based on this decision the process models and descriptions were stored in a logical way. All employees have access to this information while authorized employees can also make modifications and changes. The final phase in the BPR approach is to create a management control system for the organization. For every sub department within the e-government services a control mechanism or a combination of control mechanisms should be implemented. It is very important to choose the control mechanism that is in line with the nature of the function. Wrong control mechanisms can jeopardize the performance of the organization. For example, applying result control to help desk personal is risky because they have to perform their job with ITIL standards. They don't have the freedom to take those actions they believe will be best to produce the desired result. The actions they have to take are formally described in work instructions. There are standard procedures to establish consistency across the organization. Otherwise customers will be served in different ways for the same request. Action control is more in line with the nature of this function. It was decided not to choose one control strategy for the whole organization. Every department will be controlled with the control strategy that is in line with the nature of the functions that are provided by the department. For the help-desk the action control strategy was chosen while the functional administration is controlled by a combination of result and action control mechanisms. For the project management department the result control mechanism was implemented.

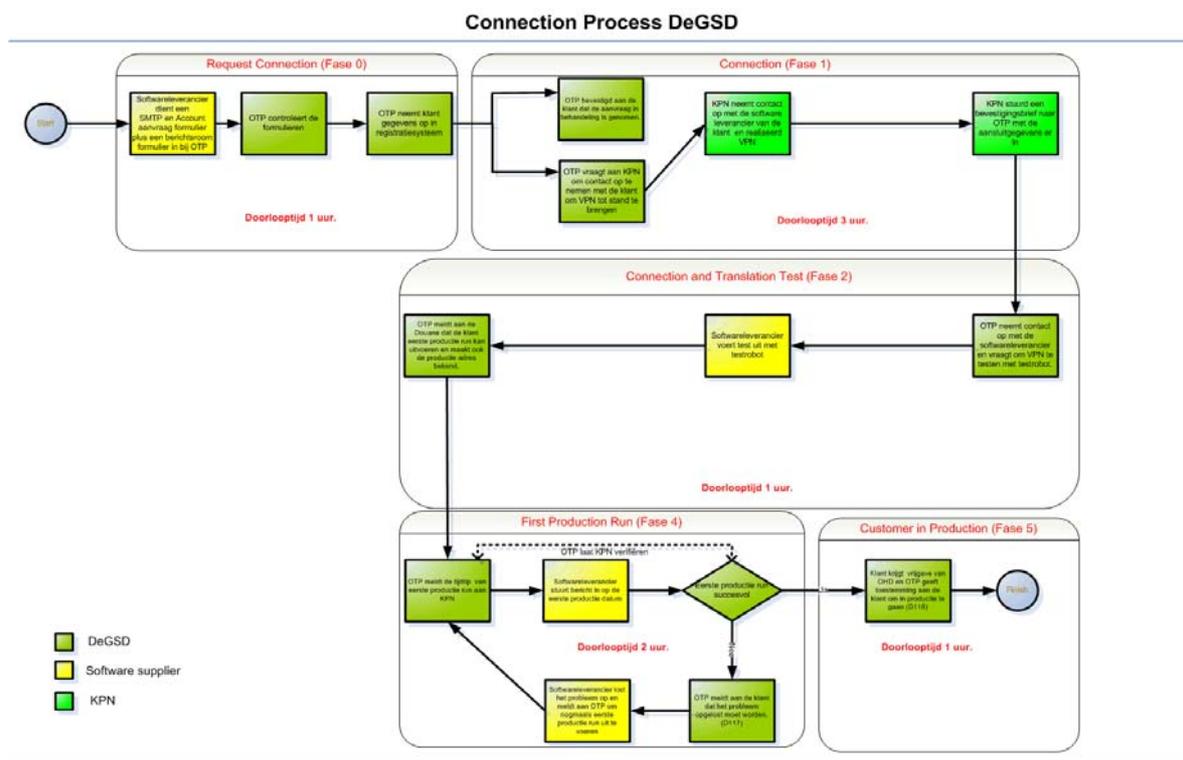


Figure 4: Business process model DeGSD after optimization

4. Conclusions

Modern governments have some innovative challenges. They have to keep in pace with the growing demands of their customers for more efficient service delivery. This can be realized by offering ways of interacting with the government via ICT. However in most government organizations this will mean that the back-office processes need to be redesigned.

The business improvement project at DeGSD has demonstrated that the developed BPR approach consisting of EIA, BPM, Management Control and Knowledge Management techniques can be used

in a very successful way to analyze and understand operational business problems in an ICT environment. In our approach we used EIA as a starting point because it describes all relations and information exchange with all stakeholders. This is different compared to more traditional approaches which (when it comes to automation) tend to have a main focus on the internal processes whereas our approach aligns the processes and systems across different participants in the supply chain. Besides, our approach also includes management control mechanisms to ensure that the organizations strategy is in sync with its processes and activities performed by the employee's. Management control is crucial in enabling the continuous measuring and improving of the organizational performance and to realize governance. In the DeGSD case, the process execution time to set up a VPN connection with companies has been reduced from some 60 days to 2 days.

5. Discussion and future research

This research can be labeled as explorative and the BPR approach is applied to improve the primary processes of a single organization. Therefore, we should be careful to generalize the results and findings of this investigation. Although the proposed BPR implementation approach worked in the DeGSD case further validation is necessary. Therefore we suggest that more case studies should be done. Future experiences from the application of this approach in different case studies in different parts of the public sector will be included into the BPR method. Also the developed method might be used to improve business processes in organizations in the commercial sector.

Furthermore the organization in which the method is applied is relatively small so the scalability of the developed BPR method should be researched. Another interesting research project is to determine whether all phases in the approach are equally important, in the described project no distinction in importance between the project phases was made or found, however this could be different in other situations.

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