PROCESS MODELLING – BURDEN OR RELIEF?
Living Process Modelling within a Public Organisation

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Abstract: Process modelling and process reorganisation are key criteria in regards to successful implementation of e-government. Yet up to recently, e-government had a rather technical dimension. Nowadays, it is being recognised that e-government is multi-faceted and that it requires a holistic approach. However, the questions of 'how can the concept of Business Process Modelling (BPM) be applied successfully' and 'what is the added-value of managing an authority's processes' often cannot be answered immediately and directly due to the complexity of this topic. So, many public authorities shy at thinking in a comprehensive way and, instead, continue to focus on single issues because these are simpler to understand and easier to manage. The aims of this paper are to create awareness about the added-value of integrated business process modelling, to introduce a holistic concept for the analysis, re-organisation and modelling of government's processes and to propose a tailor-made methodology for describing the processes. The authors will go deeply into the topic of process management with specific requirements of public authorities including legal as well as security aspects. Reading through this contribution, the reader should easily recognise the added value of BPM for public administrations and that the management of processes within public administration is a relief and not a burden.

1 INTRODUCTION

In the last few years the term e-government became a synonym for modernisation of the public sector, better services to the citizens, integration of the citizens into the political decision making process (e-participation) and increase of efficiency within government. This keyword was determined by a number of political strategies all over Europe like UK-online and the e-government interoperability framework e-GIF[1] in Great Britain, BundOnline2005[2] in Germany, eAustria[3] in Austria or the regulation of the European Union[4] to create prerequisites for an efficient administration until 2005.

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[1] Office of the e-envoy, http://www.e-envoy.gov.uk, and e-GIF

http://www.govtalk.gov.uk/schemasstandards/egif_document.asp?docnum=731

[2] BundOnline 2005 in Germany, http://www.bund.de/BundOnline-2005-.6164.htm

[3] e-Government initiatives and strategies of Austria's chief information office and ICT-Board, www.cio.gv.at

[4] Initiatives eEurope 2002 and eEurope2005, europa.eu.int/information_society/ eeuropenews_library/eeurope2005/index_en.htm

Since e-government is not any more understood only as introducing ICT into the governmental work, but is being perceived as a multi-faceted paradigm for modernising public administration and governments (c.f. the communication of the EC on the role of e-government in 0), a brief determination of the expression for our scope is required. In accordance with 0 0 0 0 and 0, we refer to the part of e-government that addresses the usage of ICT in order to efficiently serve customers of public administration (citizens, companies, NGOs, NPOs, intermediaries) and governments themselves.

As a request of above mentioned national and international strategies and policies towards successful implementation of e-government, process modelling and process reorganisation are becoming key criteria and a major part within such projects. This may be due to the high complexity of governmental processes and organisational structures. Another reason may be that, up to now, focus of BPM tool developments was put on the industry sector, where BPM has been accepted as an important step in modernisation and optimisation of business processes. Appropriate modelling methodologies and tools for the public sector are not really available yet.

In this contribution, we demonstrate that process modelling is not a burden to public organisations but a turnkey solution to support public administrations in the efficient and effective reorganisation and re-engineering of administrative processes towards customer-oriented online service provision.

Section 2 of this paper investigates BPM in general and in specific within the context of public administrations. Based on that, tool and methodology requirements are discussed in section 3. Since security and privacy are key criteria in governmental service provision, section 4 investigates such requirements and describes a concept to model security aspects with the support of a comprehensive BPM tool. Section 5 concludes with a discussion of the added value of such a holistic BPM-tool for the public sector. I.e. the benefits of introducing process management into public organisations and of describing security requirements for internal processes as well as for processes related to the citizen are highlighted.

2 BUSINESS PROCESS MANAGEMENT

Business Process Management (BPM) comprises a number of different tasks concerning organisational processes. BPM is often used as a generic term for Business Process Reengineering (BPR), Quality Management or Implementation of Workflow Management Systems 0. Important parts of Business Process Management are the acquisition of relevant data and the illustration of models of the organisation, the products and processes as well as the usage of resources like for example information technology. The analysis and simulation of the models deliver advice for the strategic optimisation and quality assurance.

The state-of-the-art in the area of modelling of organisations is based on fixed meta models. A meta-model is the formalism the modelling bases on (or more detailed information read 0).

Requirements for a modelling platform like flexibility, adaptability and openness should be fulfilled by environments providing flexible meta modelling capabilities 0. The main characteristic of such environments is that the formalism of modelling – the meta model – can be freely defined. Such a meta modelling tool was developed by BOC in the mid 90s[5]. The idea of being flexible, adaptable and open for all business branches turned out to be successful.

Talking about all branches also includes public administrations. Being successful in this area means to find out what public authorities want and need from process management. The lack of an already existing modelling tool leaded to the initiation of a research and development project in Austria to implement and customise a BPM methodology and tool specifically targeted for the public sector. This project result is called ADOamt[®] [6]. The approach is to develop a modelling tool, which realises the most important requirements to support the implementation of e-government solution from a business process management (BPM) and integrated service modelling perspective. Some of these requirements are the identification of actors and their roles, the definition of possible communication channels, the transparency of the flows, the standardisation of terminologies for an efficient and transparent communication, the integrated modelling from the portal to the back office and the integration

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[5] ADONIS[®], www.boc-eu.com

[6] www.adoamt.com

of the citizen as customer and company clerk as service provider.

2.1 BPM within Public Administrations

Government's internal and external traditional business processes need to be adapted to electronic businesses processes. For the external perspective, this means to provide public services in a well-structured and well understandable way meeting the needs of the specific users (i.e. citizens, businesses, other organizations). Here, re-engineering of business processes for better serving the needs of citizens or enterprises in specific situations ("life-events, business situations") is an important option 0 0.

Implementing integrated e-Government means to adequately map external service structures to internal process structures of public authorities as well. Integrated service and process models are of utmost importance for achieving a seamless government. A great help in this respect is a logical and organizational separation of front offices, which bundle citizens' demands and pass them on, and back offices, which satisfy these demands through adequate business processes and products.

Apart from the process perspective, a comprehensive approach towards BPM requires the integration of different resources and perspectives, like (cf. 0)

− **Users:** as already mentioned, government activity is strongly impacted by the variety and diversity of stakeholders involved in a certain business case.

− **Laws:** government activity is heavily based on legal regulations and norms.

− Security: government activity requires high security and trustworthiness as well as implementation of privacy decrees. Customers call for the same quality of security in e-government as in the traditional way of service consumption.

− **ICT resources:** to implement e-government one needs to know, which applications, data resources and network protocols are used.

− Organisation: as already mentioned, BPM is strongly related with the organizational structure of an institution and its relation to other institutional bodies.

− **Data, info and knowledge:** official proceedings require data and document input and outputs. One has to integrate these resources adequately in the process workflow.

To realize the need of developing such integrated process models, an appropriate BPM methodology

and tool is key. Section 3 of this paper is introducing the project approach, the practical implementation of the BPM tool as well as a critical discussion of the topic.

3 TOOL AND MODELLING REQUIREMENTS

As pointed out above, e-government requires a holistic concept and integration of technological, organisational, user-specific and process-specific dimensions. An integrated approach of BPM is an instrument to harmonise the issues of these dimensions and to realise a comprehensive business process re-organisation motivated by innovative IT potentials (see also 0).

The project idea was born after the authors experienced the lack of an appropriate modelling methodology for the use within e-government project on national and international levels[7]. Basic requirements from the administration point of view were the comprehensive insight into inter-organisational and front- and back-office processes, an integration of the organisational and technical perspectives, a horizontal integration in respect to service bundling or an integration of decisions in the limelight of political strategies of governments.

As stated in the introduction of this paper, Austria is in the middle of the transformation from government to e-government. Huge projects launched by the federal government, clear directives for federal, regional and local administrations and the new e-government law[8] are pushing authorities into the information technology age. A big issue is the transformation of processes as they are executed now to processes automatically executable.

ADOamt®, the modelling methodology covering the requirements of public administrations to identify, describe, analyse and document their processes, was developed within a nationally funded project, approved in some practical projects and is now in its second development phase. The following sections will describe the procedure model within ADOamt®, some project insights as well as a critical discussion about introducing BPM with ADOamt® at public administrations.

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[7] see http://www.egov-project.org and [11]
[8] E-Government-Gesetz; January 2004

3.1 Procedure Model

Through the provision of a number of different model types within ADOamt®, diverse management approaches can be followed within the BPM tool. Process models are seen as the core element as the process flow, upcoming decision paths, activity descriptions, documents links, executing roles and performers and other resources are identified and described. The strategy-/planning model supports the life-event approach described in [11] [12]. The products and services offered by public authorities can be depicted and linked to the process models executing such services. Security aspects, described in more detail in section 4, are an important issue within e-government and are therefore handled in a separate model type.

Use case diagrams, activity diagrams and class diagrams from the UML notation are provided to follow a model-based application development. Another management approach supported by ADOamt® is the IT infrastructure management to administer the underlying IT within public authorities.

All the model types are interacting with each other to form an integrated, multi-level business process management tool.
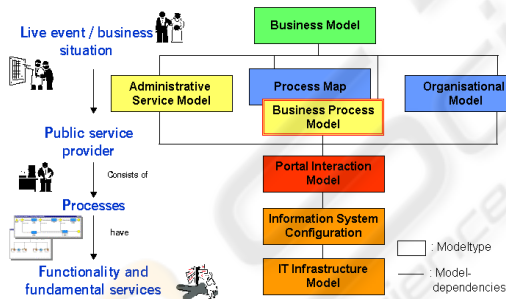

Figure 1: Holistic Process Modelling Framework

In order to scoop out the whole spectrum of the tool the following modelling procedure is suggested. Starting from the description of products and services in the strategy-/planning model, either following the life-event approach or in form of a business model, the products and services are assigned to organisational units providing them. Business processes are describing the procedure, how products and services are provided to the citizen and how internal processes are executed. The processes are modelled on swim lanes to structure the activities according to the involved roles. The working environment, depicting the organisational units with their performers and roles, is process-oriented and is directly assigned to the process models. The business process with security aspects is automatically generated out of the business process and provides security attributes to be documented according the description given in section 4 of this paper.

If the technical part of the realisation of e-government projects should also be model-based, several model types are provided within ADOamt®.

3.2 Project Experience and Critical Discussion

The first project period was finalized in November 2002. From this time on the project members were eager to practically use the modeling methodology in practical projects to get some feedback and results from public administrations.

ADOamt® is used in projects with reference cities by a local team of ministerial delegates and an internationally operating consulting company[9] as well as in several Austrian ministries.

Experience showed that most e-government projects with the aim to provide services to the citizen via an online platform do not take business processes into consideration. The general attitude about business process management in federal governments is rather negative as it is often seen as additional not necessary work. Federal governments are workflow-oriented to tighten their internal organizational processes and their service processes. But from the authors point of view the identification of the as is processes is of utmost importance in order to identify the automation potential of the should be processes. Several applications show the results of that attitude and are not really timesaving and satisfactory for the citizen (e.g. mobile parking or annual adjustment of income tax).

The situation for local authorities is a bit different. Business process modeling is seen as a burden rather than a relief. But especially for small organizations, business process management can offer numerous advantages like the efficient usage of limited resources or cost saving online services for the citizen.

Critics of the business process management approach may have the argument that BPM is time consuming, costly or even more confusing to not experienced project responsibles. Maybe in some point they are right, but with the right concept, the

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[9] CIO Office, www.cio.gv.at, and Unisys

appropriate support and a flexible management integrated business process management can be seen as strategic assistance in executing successful projects.

The next section is concentrating on the security aspects within e-government applications and the need of documentation of such aspects within process models.

4 SECURITY ASPECTS

Mapping conventional business process models of public administrations to e-governmental applications requires keeping an eye on security aspects. Ideally, during the modelling phase the process owner should be already faced with security requirements and their impacts. However, in a business process modelling tool there is a need to express security requirements in an abstract way. As a result, close to the business process model some kind of security model should arise.

4.1 Security Requirements for e-Governmental Applications

Talking about e-government means to talk about IT security. The aim is to build a system guaranteeing at least the same security standards than conventional governmental applications provide nowadays. Moreover, within such new applications users and providers are facing even higher security risks. Thus, there is a need to take a lot of additional efforts for reducing these rising threats.

Giving a brief overview, we have to ensure at least the following principles 0:

- Identification
- Authentication
- Non-Repudiation
- Confidentiality
- Data Integrity
- Availability

Identification means to identify some entity, namely the user, in context with the application. In order to ensure that a person is really the one it claims to be, there is a need for some kind of authentication. There are a lot of possibilities to realize authentication. Especially in context with e-government, citizens may use their smart cards for this purpose. In some circumstances, there is no need to authenticate a person by the use of such a

strong mechanism. Very often it would be sufficient to do this by asking for some ordinary credentials such as a password or a PIN.

Non-Repudiation is of paramount importance, in e-governmental applications respectively. Not only the user has to be forced to do not repudiate his actions, but also public authorities have to do so either. Confidentiality and data integrity seems to be naturally, however, they are one of the most important requirements.

At last, depending on the application availability may become very important. It is obvious, that very critical processes have to be realized redundantly in order to guarantee that the process keeps on running anyway.

Beside these major requirements, local legislative administrations may add some additional requirements defined by law. Depending on the local situation, data protection laws[10] or e-governmental laws[11] have to be considered.

4.2 Modelling Security

Conventional business processes contain a lot of security measurements and security requirements without knowing them explicitly. For example, client authentication at some public administrative offices takes place without any additional effort by simply adding the client's signature onto the form. In some cases, there is also a need for strong authentication in the sense of presenting some personal ID-card or some kind of birth certificate. Many of these security measurements and security tasks happen without being noticed. In e-governmental applications, these security tasks have to be rebuilt by some adequate IT security measurements.

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[10] E.g. in Austria: Datenschutzgesetz (DSG 2000). StF: BGBl. I Nr. 165/1999 idgF.
[11] E.g. in Austria: Bundesgesetz über elektronische Signaturen (Signaturgesetz – SigG), BGBl. I Nr. 190/1999 idF: BGBl. I Nr. 152/2001
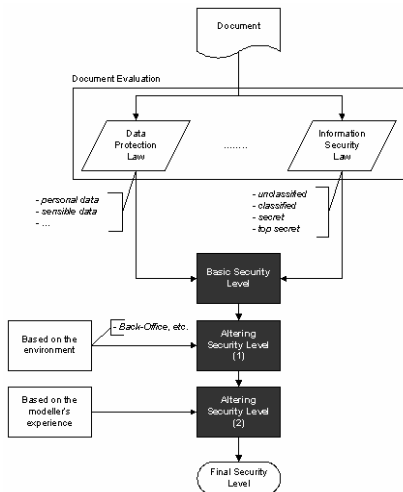
Figure 2: Approach for modelling security

Therefore, in order to be able to create a business model, which should contain all the information for transforming it into e-enabled processes, these hidden security requirements have to be discovered and they have to be inserted into the business process model as well.

Since business process modellers are normally not familiar with IT security and since IT security can become quite complex especially with regard to the high security requirements given within e-governmental environments, there is a need to describe security on a quite high abstraction level.

Providing an easy approach for modelling security related aspects within business process modelling the following workflow is applicable (Fig. 1), which consists of the following steps:

Fig. 1 Workflow for security level determination
- Evaluation of the document
- Altering the security level based on the environment
- Altering the security level based on the modeller's experience

Document Evaluation: Modelling security, as described in this paper, is based on the thesis, that the level of security of an activity, or of the process as such, is demanded mainly by the data contained in the documents used. In other words, the data contained in the forms and records involved in an activity define the basic security requirements.

Based on the evaluation of the data contained in a document it can be categorized with different security levels. Such a security level is a quite good abstraction describing the strength of security measurements that have to be implemented.

Consideration of the Environment: The basic security level retrieved from the document evaluation step may be altered depending on the environment of the process. Therefore, activities working in the back office area may require a lower level of security although the data and documents require a higher level of security. In such a situation, the environment provides some security itself resulting in a lower overall security level.

Altering the resulting security level by using the modeller's experience: The modeller's experience should be used to vary the resulting level of security as well. Thus, for any good reason the modeller is able to correct the resulting level of security according to the situation. Of course, any alteration has to be explained by the modeller. Such an explanation is important for an optional evaluation process asserting that the security requirements claimed by the model are sufficient.

Summing up, a document or its data respectively require a basic level of security. Based on this basic level, the modeller can modify it and he is asked for adding his experiences and to consider the environment either.

4.3 Influences on the Tool

Within the tool, the conceptual workflow presented in the last section is the basic idea for modelling security. Therefore, for creating a business process model containing security requirements as well, the modeller has to obey this workflow.

This means that in a so-called document model all existing documents have to be evaluated based on their contents as described in the workflow. Thus, the tool provides the possibility to compare the content with applicable criteria allowing categorising them easily. For example, in an Austrian version of the tool, these criteria are partially taken from the local legislation such as the data protection law or the so-called information security law[12]. Both of them allow to evaluate documents and to categorise them in security levels.

An activity using these categorised documents inherits initially the level of security given by them. If several documents are used, the highest level required by at least one document is the one the activity gets assigned.

To depict the security level required by an activity, a special security view is helpful.

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[12] E.g. in Austria: Informationssicherheitsgesetz (InfoSiG), StF: BGBl. I Nr. 23/2002 idgF.

Therefore, the models illustrating activities from the security perspective can be divided into three parts: the input, the output and the process itself. Figure 3 depicts a symbol for a business activity (in the security view) showing the three parts and their security levels.
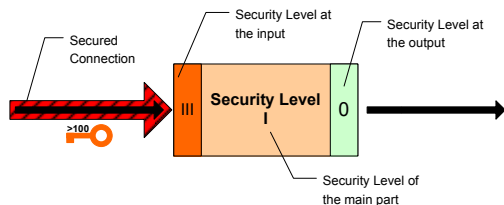

Figure 3: Activity with security levels

Each of them requires different levels of security depending on the documents used and depending on the given environment as well. Thus, on one hand it is possible to have some critical documents requiring some higher level of security at the input of an activity. On the other hand, the documents used at the output may be not the same. Thus the output requires a lower level of security. This is why the input and the output are considered separately from the point of view of security. The main part describing the security level, and security requirements respectively, of the process itself can vary not only depending on the documents used but also with regard to the activity's environment.

As mentioned before, the workflow used to determine the resulting level of security is influenced by the environment of the process and by the experiences of the modeller. Thus, the tool provides a lot of possibilities for altering the basic security level given by the documents. If the modeller decides to vary the security level inherited from a set of documents, he is forced to give some arguments for reasoning. As mentioned above, these arguments are very important in the case of verification of the security requirements. Especially within e-governmental applications, processes and their security requirements should be verifiable.

Throughout the whole work on modelling the business process and considering the security requirements, the user is never touched with technical details concerning the realisation of the required security measurements so far. However, the tool and the resulting business process model should deliver requirements for the IT specialists realising the process and its activities as well. Therefore, since the user assigns abstract security levels only, though, these security levels can be mapped to hard requirements for the IT specialists.

Table 1 gives an example of the assignment between security levels and their corresponding security requirements and their security measurements respectively.

Table 1 Mapping security levels to security measurements

Sec. Level	Ident./ Auth.	Additional Requirements	Comm.
0	-	-	-
I	-	standard system	SSL/ TLS
II	chall. resp.	ID-card dig.signature	SSL/ TLS
III	certificate	no manipulability	SSL/ TLS

Nevertheless, the process modelling tool should provide some settings, which give an advanced user the possibility to add concrete security requirements. For example, requiring authentication by the use of certificates or by the use of some challenge-response mechanisms may be specified during modelling.

Modelling security requirements by the use of a process modelling tool enables to simulate and calculate additional efforts caused by the security measurements. Therefore, a set of data describing the additional efforts raised by using security technologies must be available. Due to the wide variation of security mechanisms and their implementations respectively, it is necessary to collect these data in an environment similar to the target environment given in a public administration for instance.

However, by the use of such sets of data in context with the security model, the process modelling tool might simulate additional efforts needed, e.g. time delay, additional costs, etc.

5 ADDED-VALUE FOR PUBLIC ADMINISTRATIONS

In previous sections we already discussed advantages and added values of using business process management within public administrations. These paragraphs should now stress the added values for authorities at different levels: local, regional and federal.

Three objectives of utmost importance within public organisations could be named efficiency increase, quality increase of public services and standardisation in the sense of reference processes or standard interfaces to operative systems. These goals

can be achieved with the help of management approaches like business process management, quality management or IT Management. The integrated approach described in this paper supports such management approaches and can be the basis for an integration platform.

Local authorities have different priorities and objectives than regional or federal. Cities or villages heavily emphasise on the development of a catching Internet presentation of their organisation. Offering public services via the Internet needs the transformation of processes to e-processes, that is the possibility to execute processes online. Business process management optimally supports this intention by finding, describing, optimising and documenting governmental processes. An example of such an e-process could be the online application for a new passport or the online registration.

Another big issue in local governments are reference processes and the communication and cooperation with other local authorities. By providing reference processes to cities a lot of effort can be avoided. The process for an application for holidays for example could be standardised and published in the intranet/internet to be available to all employees.

The regional level itself pursues different objects. It is quite important for these authorities to be well coordinated in their daily treatment with local and federal organisations. Therefore standardised processes should be the major goal. These processes can be developed by an integrated management approach including the description and documentation of the processes, the implementation of interfaces to standard software or legacy systems and the transformation of the business processes to workflow management systems for online execution. The measurement of indicators and goals combined with the business processes is becoming a major issue for public administrations.

Last but not least federal governments define their objectives on a higher level. Comprehensive e-government projects surface the IT landscape of federal authorities, portals for online public services are developed and standardisation efforts became of utmost importance. These goals demand a well-structured organisation that could be realised with the help the integrated business process management toolkit developed in the project described above. Process modelling is an essential aspect in e-government projects in order to depict the significance of the changes and necessary adoptions of procedures and products within public administrations (for example online public services).

The integration of organisational and IT perspective as well as strategic and operative level become a crucial success factor. The process modelling tool ADOamt® faces the challenge and supports public authorities in their whole process life cycle – from the strategic decision over design of processes to the execution and evaluation. The modularity and openness of the process modelling tool offers the possibility of the integration of different software tools like workflow management systems, standard software or groupware tools. The integrated modelling from the portal to the back-office including the underlying IT architecture as well as the integration of the involved parties (citizen, organisation, administrative clerk, etc.) form the core of ADOamt®.

6 CONCLUSION

After more than one year of working intensively with the topic process modelling within public administrations and the development of a tailor-made modelling methodology the authors come to the conclusion that public authorities need an integrated platform for developing innovative and new public services in order to become more citizen-oriented and transparent in their day-to-day business. The high level of interest in our work coming from representatives of different administrative organisations makes us confident that we are on the right way helping e-government projects become successful.

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