

Realigning Public Administrations with the Concept of Electronic Government: How to Prepare Process Oriented Reorganization Project

Lars Algermissen

University of Muenster, Dept. of Information Systems, Leonardo-Campus 3, 48149 Muenster, Germany
islaal@wi.uni-muenster.de

ABSTRACT

Process-oriented analysis and optimisation of administrative procedures are key prerequisites for a successful organisational and technical restructuring of public administrations in the move to E-Government. Exploitation of the full potential of IT can only be achieved through structured procedures. The high degree of complexity of process models, resulting from the multitude of modelling aims, objects, methods and users, requires both systematic preparation, and a methodical approach to the implementation of process-oriented E-Government projects. This article focuses on the systematic preparation of reorganisation projects and answers the questions 'why' modelling should be done, 'what' should be modelled and especially 'how' modelling should be prepared.

INTRODUCTION

From the beginning of the 90's, public administration has been confronted by a series of new demands. Society has been transformed by the influence of new technologies. There is a strong trend towards growing individualisation, whereby there are increasing demands by individuals on the state. Simultaneously, in the context of national and international competition, efficient and effective state activity and support for entrepreneurial activities in a region or country are becoming an increasingly decisive factor in location decisions. No one has yet succeeded in improving the performance capability of the state, in a manner and degree that is commensurate with the increasing number of responsibilities. According to Budäus and Schwiering (1999) a modernisation and performance gap has arisen because of the difference between the volume of work and performance.

For some years, the term Electronic Government, coined from E Business, has been universally proposed as a way of closing this gap. The core of E-Government is the execution of administrative processes (Langkabel 2000, p. 6; von Lucke and Reinermann 2000, p. 1). In order to support the implementation of a process by means of information and communication technology, the following definition has been formulated by Algermissen and Niehaves (2003):

Electronic government entails the simplification and implementation of information, communication and transaction processes, in order to achieve, by means of information and communication technology, an administrative service, within and between authorities and, likewise, between authorities and private individuals or companies.

In recent years, many businesses have already initiated and successfully undertaken measures to strengthen the organisation of business processes. At the same time, the academic disciplines of Business Management Studies and Business Information Technology have taken up this issue (Hammer and Champy 1993; Hammer 1990; Davenport 1993; Earl 1994). Commensurately, fields such as process modelling,

workflow management or process cost calculation demonstrate a deep understanding of theory and have consequently attained a high standard of development.

However the practical application of this knowledge, acquired in the domain of administration, has only occurred to a limited degree. Alongside an insufficient translation of theoretical knowledge into practice, the urgent practical challenges of process management, for example, and the design of procedure models for specific domains, have not so far been adequately taken up by the relevant academic disciplines and conceptualised soundly.

The purpose of this article is to stimulate an improvement in the situation outlined above. The objective is the presentation of a systematic approach how to prepare process oriented E-Government projects. As a rule, comprehensive preparation is essential for process modelling, because, on the one hand, the model design is characterised by a high degree of process complexity and on the other hand, the information model is characterised by a high degree of object complexity. When considering the aim of the modelling, it is necessary to determine both the object of modelling, and the modelling methods and tools.

As an introduction we first provide an overview of related work. In section one we briefly describe different modelling objectives and explain, why organisational design is one of the most important aims of process modelling in the context of E-Government - ('why' should be modelled). In section two we identify requirements for a modelling method based on the domain E-Government and the modelling objective organisational design. The requirements lead to the selection of event-driven process chains (epc) - ('how' should be modelled).

In section three we show how the target environments for modelling projects can be identified. Based on a public service classification scheme we therefore introduce a two-phase procedure comprising the successive application of the portfolio analysis and the profile method - ('what' should be modelled).

The paper ends with conclusions and suggestions for further research.

RELATED WORK

Business process modelling and business process reengineering are the dominating topics in the discussion of enterprise modernisation (Harrington 1991; Hammer 1993; Davenport 1993; King 1994; Hammer and Champy 1993).

Several methods, techniques and tools have been developed and implemented to support process oriented reorganisation (Keen 1991; Kettinger, Teng and Guha 1997). The Architecture of Integrated Information Systems (ARIS) presented by Scheer, is an approach for specifying organisations and information systems (Scheer 2000). The four different perspectives data, functions, organization, and control,

each consisting of the three layers of conceptual model, technical model, and implementation, can be used to model different aspects of a software system from a business perspective as well as an IT perspective.

Modernisation efforts are also undertaken in the area of public administrations. The discussion of public administration modernisation and E-Government is often limited to the provision of online services and public administrations' internet portals. Big steps towards an integrated European E-Government were taken within the eGOV project, funded by the European Commission. Within this project, an integrated platform for online one-stop government was specified, developed, deployed and evaluated. Based on "life-events" the effectiveness, efficiency and quality of public administrations' services were improved (Krenner 2002; Wimmer 2002).

Much remains to be done, both optimisation of services delivered via Internet (e.g. One-Stop-Government), and the optimisation of public administrations' internal and inter-organisational processes (Naschold and Daley 1999; Traunmueller and Wimmer 2001).

In order to reach the goals described we show one approach how the optimisation of administration's processes can be prepared: the questions which will be answered are why, how and what should be modelled in order to generate benefits in public administrations through process oriented E-Government projects.

SELECT THE MODELLING OBJECTIVE

The main aims of process modelling according to Rosemann and Schwegmann (2002, p. 58) are organisation and application system design.

Organisation Design:

- Organisation documentation
- Process-oriented reorganisation
- Continuous process management
- Certification
- Benchmarking

Application System Design:

- Selection of ERP software
- Model based customising
- Software development
- Workflow management
- Simulation

Models for organisational design require a high degree of clarity, whereas models for application system design require a high degree of technical precision, because of their close relationship to the final implementation.

The above listed purposes of process modelling obviously force the process models to meet certain different requirements in terms of content and methodology. With respect to contents, the requirements differ in the related model components. The first step in order to improve public administration's processes and make them suitable for E-Government applications should be organisation design, in particular, the process-oriented reorganisation. An examination of application system design is only considered worthwhile on the basis of organisational process improvements (Raymond, Pare and Bergeron 1995).

SELECT THE MODELLING METHOD

Modelling Method: Requirements

There are various and diverse model types for modelling (business) processes. Petri-nets (Jensen 1985), added-value chain diagrams (Porter 1990) and event-driven process chains (EPC) (van der Aalst 1999), are amongst the best known. The choice of a model type is influenced mainly by the purpose of the application and the requirements of the model users. Application aims, such as simulation and workflow management, require model types which produce detailed, precise, formally itemised models. Application objectives such as process-oriented reorganisation require less formal models. In this case, *clarity* is especially important.

For a modelling method to meet the requirements of administrative processes, their most salient characteristics need to be considered first (Scheer et al. 1996, p. 120):

- Information processing functions predominate. Even if actual products are being produced, information processing predominates as the main resource for the public administration is information.
- Business processes are regulated either by law or at least hinge on legal regulations. This frequently leads to inflexibility and long time horizons for change.
- The responsibility for business processes is divided among a number of people, who work only on a small portion of the process "bureaucratically". There is an enormous flow of documents between the individual stages. Because of this decentralised structure it makes the integrated overview of a business process more difficult.
- Citizens must be treated equally, irrespective of origin and assets, because of legislation and its legal implications. A high degree of procedural soundness, stability and comparability must be ensured.

Based on the characteristics described, the most important requirements of a modelling method are summarised as follows:

- Simple principle, clear presentation
- Comparability between various models
- Presentation of information systems
- Presentation of organisation units and places
- Presentation of information flow

Modelling Method: Selection

Based on these requirements, the Event-driven Process Chain (EPC) is often selected as a method in several projects, because of its high degree of clarity, and its potential for integrated evaluation. The high level of clarity is especially important in the interview phases as the results are usually documented in process models and have to be verified by the employees. Moreover the final presentation of target processes has to be easily understandable for a range of individuals with heterogeneous backgrounds (e.g. mayor or information technology officer). The other advantage is that weaknesses in the processes could easily be identified by analyzing the models.

SELECT THE MODELING OBJECT

Before the first modelling process, relevant problem areas should be (1) identified, (2) classified and then (3) prioritized with respect to financial and personnel resource constraints.

(1) Business process framework for identification of target environments

An analysis of the organisational structure of the public administration and its effects on the organizational structure should be summarized to serve as a guiding principle for the processes to follow. The most suitable way of doing so is to use a business process framework. A business process framework divides the structures of the administration on an abstract level by a selected organizational paradigm and clarifies the relationships between the individual parts of this framework. It is important to adapt the business process framework according to the gained recognition of required processes. Often, the final business process framework is not ready before the process modelling is completed. After the modelled processes are implemented or when presenting the organizational structure, the business process framework can then be ideally used as a communication means and as a navigator through a number of process models that were generated within the scope of a project.

Figure 1 shows a framework for municipalities, which helps to identify potential target environments for organizational engineering. To support that, management processes, operative and strategic core processes and supporting processes are differentiated.

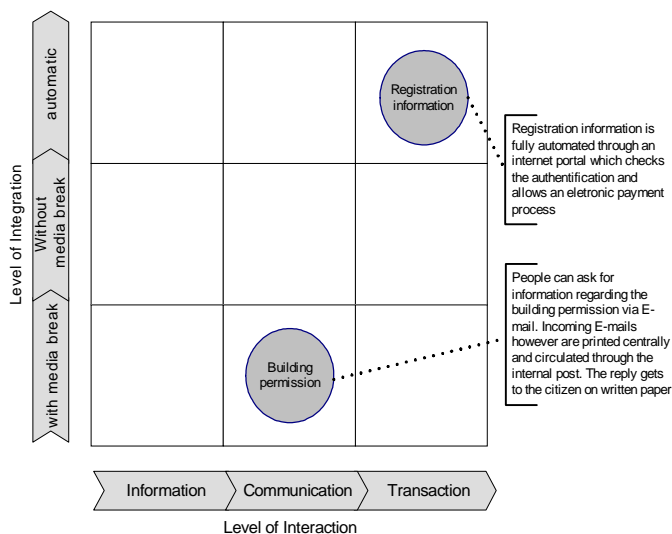
Figure 1: Framework for identification of processes

The most relevant processes for E-Government projects are the core processes as they are directly connected to the environment consisting of citizens, companies and other administrations. After identifying the relevant target environments the next step is to classify the underlying processes, usually more than 1000 different ones in a common German municipality.

(2) Classification of processes in target environments

A classification scheme is an appropriate way of structuring the identified services, taking into account different perspectives. In the context of the administration domain, the application of an internal and external perspective is provided, to show potential for improvements in administration (greater efficiency) and also for the citizens as customers (improved performance). The degree of interaction between citizens and local government can be a performance criterion. Three levels, information, communication and transaction have been widely used (Budäus and Schwiering 1999, p. 155; Boller and Beuchat 2002, p. 56). On the other hand, the degree of integration is used as a measure of the efficiency of a service and is part of the internal perspective. A hierarchy, for instance, can be structured according to whether a service is performed with media breaks, without media breaks, or completely automated. If the level of interaction and the degree of integration are combined, a matrix will be obtained, which can be of assistance in categorising and classifying existing services in a municipality (see Figure 2).

Figure 2: Classification Scheme for Administration Services



With the aid of a classification scheme, the extent of application of individual services can be visualised at a glance. In this manner, services, for example, can be identified, whose processing is already largely optimised and do not, therefore, need to be part of any reorganisation project.

(3) Prioritisation of target environments

In order to select appropriate services on the basis of classification schemes, a two-phase procedure comprising the successive application of the portfolio method and the profile method is introduced. From phase to phase, the number of services considered and the level of precision of the investigation increase through using a rising number of decision-making criteria.

The *portfolio analysis* is a tool that, at minimal cost, can provide a basic overview of the most important qualitative features of a service and can convey its potential for a modelling project (Francis and Archer 1971). It is then a question of which dimensions can provide the optimal prioritisation of existing services.

Dimension 1: The starting point is that all decisions have to be financially justifiable, because of the high pressure to contain or reduce costs. Hence local government should focus on services with a high number of cases as incremental costs decrease with an increased volume of users.

Dimension 2: For every service performed on the part of local government, there is a user on the demand side. It is advisable first to aim for increased efficiency in areas of high usage through so called power users (e.g. businesses, associations and other external institutions), as the greatest results can be achieved there. Figure 3 shows the portfolio together with some selected services.

Recommendations for prioritisation of implementation can be derived from the fields of the matrix (see Figure 3). The figures in the individual fields can be interpreted as *priority ratios*. The profile method, which is outlined in the following section, should therefore logically be used only for services that are found in field 1 of the portfolio.

The next step – the so-called *project profile method* (cp. Thoma 1989) – has the advantage of allowing the examination of the alternatives at one's disposal and with regard to several qualitative characteristics. Each aspect of an alternative is evaluated on a numerical scale of 1 to 5 and the total evaluation is depicted graphically. A distinctive positive feature is the explicit representation of evaluation criteria, which gives the decision-maker a more concrete picture of the individual services, than the portfolio presentation provides. A written definition of each numerical rating is given in the key.

Figure 3: Service Performance Portfolio

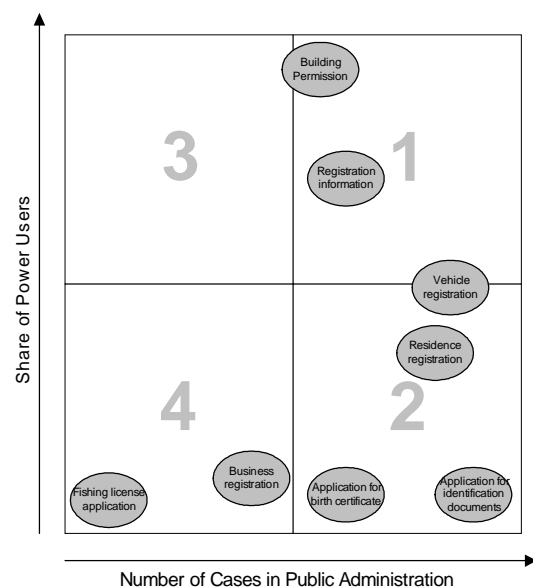


Figure 4: Service Profile for Registration Information

Service:	Information from Citizen Register				
Evaluator:	Douglas Adams (City Administration)				
Date:	2003-02-24				
Evaluation Criterion	Assigned Value				
1. Transaction frequency Customer	1	2	3	4	5
2. Transaction frequency Administration	1	2	3	4	5
3. Organisational Complexity	1	2	3	4	5
4. Technical Complexity	1	2	3	4	5
5. Necessary Level of Security	1	2	3	4	5

The scale anchoring table provides a firm basis for evaluation and avoids any deviation in the results that could be caused by the subjective interpretations of different appraisers. The visualisation of a service profile results in a matrix representation, which incorporates various evaluation criteria on one side and their possible ratings on the other. The relevant characteristics are marked by circles and connected with lines. This graphic presentation enables a fast visual estimation of a service. The choice of criteria for a service performance profile must be determined on a case-by-case basis. Figure 4 shows an example of a project profile with five features (in this case, for evaluation of the register information).

As with the portfolio method, in the case of service performance profiles, accurate results are less important in the context of prioritisation, than the straightforwardness of the application.

After this phase – the organisation possesses a prioritized list of processes which are suitable for process reorganisation. The process modelling and reorganisation itself will then commence with the phases:

- As-is modelling and process analysis
- To-be modelling and process optimisation
- Process implementation and process roll-out
- Continuous process management

CONCLUSIONS AND SUGGESTED DIRECTIONS FOR FURTHER RESEARCH

The importance of the preparation of process modelling projects has been introduced. The three described steps have proven effective in achieving objectives and appropriate and correct for the several modelling projects in public administrations. Despite some remaining developmental barriers, process management in an E-Government context, is a viable mechanism for advancing efforts to modernise an administration.

It is clear that there are considerable structural analogies amongst various administrative processes within a civic authority, and to a greater extent with similar processes between authorities. In moving towards an extensive process oriented and IT-supported modernisation of an administration, the development of a reference process model as a store of domain knowledge has the potential to significantly reduce the complexity of E-Government projects and to simplify their implementation by means of an orientation around reference processes.

REFERENCES

- Algermissen, L., Niehaves, B. (2003) E-Government – State of the art and development perspectives, Working Report No. 94 of the Department of Information Systems, Muenster.
- Boller, R., Beuchat, A. (2001) Vertrauen und Sicherheit im Netz. In: Gisler, M.; Spahni, D. (Eds.): eGovernment, 2nd Edition., Bern et al., pp. 53-74. [in German]
- Budäus, D., Schwiering, K. (1999) Die Rolle der Informations- und Kommunikationstechnologien im Modernisierungsprozeß öffentlicher

Verwaltungen. In: Scheer, A.-W. (Ed.): Electronic Business und Knowledge Management, Heidelberg, pp. 143-165. [in German]

Davenport, T.H. (1993) Process Innovation: Reengineering Work through Information Technology, Boston, MA: Harvard Business School Press.

Earl, M.J. (1994) The New and the Old of Business Process Redesign. Journal of Strategic Information Systems, Vol 3 No1, pp. 5-22.

Francis, J., Archer, S. (1971) Portfolio Analysis, Prentice-Hall, Englewood Cliffs, NJ, 1971.

Hammer, M. (1990) Re-Engineering Work: Don't Automate – Obliterate. Harvard Business Review, Vol 68 No 4, pp. 104-112.

Hammer, M. and Champy, J. (1993) Reengineering the Corporation: A Manifesto for Business Revolution, New York, NY: Harper Collins Publishers.

Harrington, H. J. (1991) Business Process Improvement: The Breakthrough Strategy for Total Quality, Productivity and Effectiveness. New York, NY: McGraw-Hill.

Jensen, K. (1985) An Introduction to High-Level Petri Nets, Int. Symp. on Circuits and Systems, Proceedings, Kyoto, Japan, Vol. 2, New York, IEEE, pp. 723-726.

Keen, P. (1991) Shaping the Future: Business Design Through Information Technology. Boston, MA: Harvard Business School Press.

Kettinger, W. J., Teng, J. T. C. and Guha, S. (1997) Business Process Change: A Study of Methodologies, Techniques, and Tools. MIS Quarterly, Vol 21 No 1, pp. 55-80.

King, W. R. (1994) Process Reengineering: The Strategic Dimensions. Information Systems Management, Vol 11 No 2, pp. 71-73.

Krenner, J. (2002) Reflections on the Requirements Gathering in an One-Stop Government Project. In: Traunmueller, R.; Lenk, K. (Eds.) Electronic Government. Proceedings of the 1st international EGOV conference. Berlin et al.: Springer, pp. 124-128.

Langkabel, T. (2000) e-Government – Der Weg ist das Ziel. V.O.P., Sonderheft 2/2000, pp. 6-8. [in German]

Naschold, F. and G. Daley (1999) The Strategic Management Challenge: Modernizing

Porter, M. E., (1990), The Competitive Advantage of Nations, London: The Macmillan Press Ltd.

Raymond, L., Pare, G. and Bergeron, F. (1995) Matching Information Technology and Organisational Structure: An Empirical Study with Implications for Performance, European Journal of Information Systems, Vol 4 No 1, pp. 3-16.

Rosemann, M., Schwegmann, A. (2002) Vorbereitung der Prozessmodellierung. In: Becker, J.; Kugeler, M.; Rosemann, M. (Eds.): Prozessmanagement, 3rd Edition, Berlin et al., pp. 47-94. [in German]

Scheer, A.-W. (2000) ARIS - Business Process Modeling, 3rd Edition, Springer, Heidelberg.

Scheer, A.-W., Bold, M., Heib, R. (1996) Geschäftsprozessmodellierung als Instrument zur Gestaltung von Controlling-Systemen in der öffentlichen Verwaltung. In: Scheer, A.-W.; Friederichs, J. (Eds.): Innovative Verwaltungen 2000, pp. 119-130. [in German]

Thoma, W. (1989) Erfolgsorientierte Beurteilung von F&E-Projekten, Darmstadt. [in German]

Traunmüller, R. and Wimmer, M. (2001) Directions in E-Government: Processes, Portals, Knowledge. In: Proceedings of the DEXA International Workshop "On the Way to Electronic Government". Los Alamitos, CA: IEEE Computer Society Press, pp. 313-317.

van der Aalst, W. (1999) Formalization and Verification of Event-driven Process Chains. Information and Software Technology, Vol 41 No 10, pp 639-650. [in German]

von Lucke, J., Reinermann, H. (2000) Speyerer Definition von Electronic Government. <http://foev.dhv-speyer.de/ruvii/Sp-EGov.pdf>. Date of retrieval 2002-01-02. [in German]

Wimmer, M. (2002) European Development towards Online One-stop Government: The "eGOV" Project. Electronic Commerce Research and Applications, Vol 1 No 1, pp. 92-103.

0 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

www.igi-global.com/proceeding-paper/realigning-public-administrations-concept-electronic/32307

Related Content

Waste Gas End-of-Pipe Treatment Techniques in Italian IPPC Chemical Plants

Gaetano Battistella, Giuseppe Di Marco, Carlo Carlucci, Raffaella Manuzzi, Federica Bonaiuti and Celine Ndong (2018). *Encyclopedia of Information Science and Technology, Fourth Edition* (pp. 3156-3171).

www.irma-international.org/chapter/waste-gas-end-of-pipe-treatment-techniques-in-italian-ippc-chemical-plants/184026

The Influence of Digital Currency Popularization and Application in Electronic Payment Based on Data Mining Technology

Xiaoyuan Sun (2023). *International Journal of Information Technologies and Systems Approach* (pp. 1-12).

www.irma-international.org/article/the-influence-of-digital-currency-popularization-and-application-in-electronic-payment-based-on-data-mining-technology/323193

The Application of Multimedia and Deep Learning in the Integration of Professional and Innovative Education in Colleges

Shilin Xu (2023). *International Journal of Information Technologies and Systems Approach* (pp. 1-13).

www.irma-international.org/article/the-application-of-multimedia-and-deep-learning-in-the-integration-of-professional-and-innovative-education-in-colleges/320489

The Influence of the Application of Agile Practices in Software Quality Based on ISO/IEC 25010 Standard

Gloria Arcos-Medina and David Mauricio (2020). *International Journal of Information Technologies and Systems Approach* (pp. 27-53).

www.irma-international.org/article/the-influence-of-the-application-of-agile-practices-in-software-quality-based-on-isoiec-25010-standard/252827

Online Survey: Best Practice

Tomayess Issa (2013). *Information Systems Research and Exploring Social Artifacts: Approaches and Methodologies* (pp. 1-19).

www.irma-international.org/chapter/online-survey-best-practice/70707