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A transparent role of information systems within business processes: A case study

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Abstract	Service organisations still struggle with the adoption of a road to excellence. Evidence exists that processes and systems in service organisations are not always as advanced as in manufacturing organisations. Adding a quality smile to the face of the service provider will not solve the problems that are caused by defects in the underlying work processes and systems. Attention to the hardware in service organisations, i.e. to the service design, should instead create a more reliable process flow and time for the service staff to develop improvement activities and spend more time with customers. The way service organisations started to take excellence seriously is by making their processes transparent, eliminating undesired steps and deleting loops. In this paper the focus is on expanding this approach by adding information systems and information sources into a process map. This seems to be a promising approach for small and medium sized service organisations, without having to invest in expensive and rigid business process automation.	
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A transparent role of information systems within business processes: A case study

Abstract

Service organisations still struggle with the adoption of a road to excellence. Evidence exists that processes and systems in service organisations are not always as advanced as in manufacturing organisations. Adding a quality smile to the face of the service provider will not solve the problems that are caused by defects in the underlying work processes and systems. Attention to the hardware in service organisations, i.e. to the service design, should instead create a more reliable process flow and time for the service staff to develop improvement activities and spend more time with customers. The way service organisations started to take excellence seriously is by making their processes transparent, eliminating undesired steps and deleting loops. In this paper the focus is on expanding this approach by adding information systems and information sources into a process map. This seems to be a promising approach for small and medium sized service organisations, without having to invest in expensive and rigid business process automation.

Keywords: Process Mapping, Information Systems, Quality Management, Service Organisations

Introduction

In this paper the main issue is to extend the use of process mapping to information systems. Information systems are nowadays important in nearly every business process because almost every step in a business process is supported by information systems (Liautaud and Hammond, 2001). The use of information systems within organisations can be visualised within process maps. Process mapping has been used extensively for creating an accurate

view on business processes in organisations. This provides management with the opportunity to maximise efficiency and effectiveness of its internal processes. Clarifying the use of information systems at the same time as undertaking a mapping exercise, will create a useful insight of how efficiency and effectiveness can be further improved. Issues that can be improved in this way are for example:

- More systematic use of the available data at the right time in the business process;
- More systematic information storage, so information will be available at another step in the process, at another time, and/or another place;
- Better linking of various (information) systems in order to improve efficient and effective use of information;
- Through the improved integration of the systems, data have to be stored only at one place and thus maintenance and keeping data up to date will be easier.

A lot of research has focused on the efficiency of information systems as such (O'Brien, 2000; Ritchie et al., 1998; Laudon and Laudon, 2002), while the improvement of organisational efficiency by means of information systems received far less research attention.

Therefore, the central question in this paper is: How can a better insight into the use of (information) systems be developed in order to improve the efficiency and effectiveness of the whole organisation?

Quality approaches in service organisations

Approaches to improve the quality in service organisations have in general been shifting their emphasis away from technical conformance to specifications, towards pleasing the customer by meeting and exceeding his/her expectations (Keleman, 2003). The main focus in the service quality literature has been on the elimination of the gap between customers' expectations and perceptions and also on the creation of customer satisfaction at the moments

of truth, i.e. the moments in time when the customer interacts with the (service) organisation (e.g. Grönroos, 1983; Lehtinen and Lehtinen, 1982; Zeithaml et al., 1990).

The distinction between manufacturing organisations and service organisations is often explained by means of the extremes on the manufacturing/service continuum (Grönroos, 1983). However, in reality many organisations, both manufacturing as well as service organisations, are positioned somewhere in the middle of that continuum. So, both types of organisations should give attention to the hard side (the production processes and systems) and to the soft side (the people issues and the relational aspects with customers and other stakeholder groups). A focus on people does not always solve the problems caused by processes and systems. Moreover, maybe more important, improvement of processes and systems should give employees more pleasure in their work and time to develop quality improvements for customers, or solve customer complaints.

According to Lewis (in: Dale, 2003, p.204) “the service process is critical: if systems are poor (e.g. breakdown of computer access to customer accounts in a bank) employees get blamed and consumers perceive poor-quality service”. Still, services are seen to lag behind manufacturing in systematic quality efforts regarding the business processes within service organisations, mainly because the focus has been on the external customer (Gummesson, 1991; Redman, Snape and Wilkinson, 1995).

Classical quality thinking was focused on controlling processes and applying statistics to the monitoring of processes in order to learn from these statistics and to be able to reduce variation in the outcomes of processes (Deming, 1982; Juran, 1988). In service organisations the excuse that statistics cannot be applied is often heard, because every customer is different and variation is necessary to satisfy all those different customers. Although it might in many situations be true that variation is needed for the relational service quality aspects, there is at the same time a need for better control in terms of less variation in the basic service production processes. For example, in the case, which will be described later in the paper,

there are legal factors that force the organisation to reduce the variation in its service production processes.

To a better understanding of processes

Service organisations should not forget the roots of quality management! Going back to Taylor (1911), Juran (1988) and Deming (1982), the first step in getting better control over what is going on within an organisation, is to know and understand the basic processes. If an organisation does not know what it is doing, it is impossible to control and improve. In manufacturing this notion seems to have been accepted and developed already a long time ago. Flow-charting is a widespread and generally accepted way of clarifying the flow of various types of activities in a wide range of environments. Within service organisations this idea of making the processes transparent has only been adopted during the last twenty years or so. However, there are still service organisations that do not yet accept and use it as a way of managing their processes (Gummesson, 1990 and 1991; Dale et al., 2001). Even though specific flow-charting tools and methodologies have been developed, which better suit service organisations.

Shostack (1981) developed the idea of service design in order to focus not only on the development of products and services that are delivered to the customer but also on the way products and services are created. The most important aspect of a service design is to make the processes, which lead to the customer interaction, transparent. The flow-charting technique for service organisations - called ‘process mapping’ or ‘service blueprinting’ - have been developed by various authors (Shostack 1981, 1984, 1987; Kingman-Brundage, 1991; Gummesson, 1990). The concept of service blueprinting has been primarily developed by Shostack (1981, 1984, 1987) as a reaction to her own negative perception of the quality of service companies’ output. According to Shostack, the cause of this lack of quality was the

absence of a systematic method for designing and controlling the whole process from input to output of those companies. Her solution, service blueprinting, is a tool that gives a clear insight of the business processes needed to bring the service-product to the market. In other words, a service blueprint is a record of the service system at a particular moment in time. The technique was further developed by Kingman-Brundage (1991). According to Kingman-Brundage, blueprints can be used to reduce costs, to maximize customer and employee satisfaction, and to support the decision making process of management on the issue of the allocation of scarce resources.

A service blueprint shows the mutual relationships between the activities in a process over time. Moreover, this technique provides the flowchart with additional information about the actors, moments of interaction and contact with customers, and the information flow within the organisation. Shostack (1981) distinguishes four types of actors: customers, contact personnel (the so-called 'front line'), support personnel ('back room'), and management. The structure of the organisation will be made clear by the way the actors are ranked vertically on the left hand side of the blueprint. The customer's path (the way in which the customer thinks and behaves) is the starting-point of the notation of the process. This path goes from left to right on the process map. A simplified example, showing the structure of a service blueprint, is given in figure 1.

Figure 1: The structure of a service blueprint

The interaction between the service organisation and the external customer is made visible by means of 'lines of interaction'. 'Lines of visibility' refer to the borders between activities that are visible for the customer and those that are not. There is also a 'line of implementation', distinguishing between top management and the operational level. The groups of people within the organisation that are directly involved in the business processes, will be easily recognized as a result of this line.

Although service mapping and service blueprinting have been applied in various types of organisations (Shostack, 1981; Gummesson, 1990; George and Gibson, 1991; Tseng et al., 1999; Corbitt et al., 2000; Lin et al., 2002; Patton, 2002; Sousa et al., 2002) they have been primarily focused on making the processes transparent. As a result of the importance of (information) systems in organisations these days, it can be argued that the service maps and blueprints should be expanded to include those systems and thereby making the linkages between systems and processes more clear. A case study will be described that supports this argument, but first various information systems will be defined.

Information systems

O'Brien (2000) gives a holistic definition of an information system: "an information system is an organised combination of people, hardware, software, communication networks, and data resources that collect, transform, and distribute information through the organisation". Thus, information systems should produce useful information for organisations. Ritchie et al. (1998) identify the five most important functions of information:

- Reduction of uncertainty in decision making;
- Control over operational performance through defect signalling;
- Communication of plans, expectations for the future, and procedures;
- Historical data about transactions, performance levels and effects of decisions;
- Reduction of complexity through upgrading the knowledge of the user.

O'Brien (2000) identifies a number of information systems linked to the various organisational levels as shown in figure 2. The information systems will be described shortly starting with the systems at the operational level.

Figure 2: Information systems linked to the four organisational levels identified.

Operational level

At this level there is a need for systems to record elementary activities and transactions of the organisation. These systems are called Transaction Processing Systems (TPSs). Examples of these systems are pay-administration, stock control, production and sales information. These TPSs are data oriented and focus on historical data on activities in the organisation. TPSs are necessary for monitoring the status of internal processes and relations with the external environment. The output of these systems can be used at higher levels in the organisation, as input for other systems.

Knowledge level

At this level the goal is to create, distribute, and share knowledge. Information systems used at this level can be called Knowledge Work Systems (KWSs), Group Collaboration Systems (GCSs), and Office Systems (OSs). KWSs are developed to create knowledge (an example is computer-aided design); GCSs are aimed at supporting cooperation between employees and distributing the available knowledge within the organisation (examples are Groupware like Lotus Notes, and Intranets or Enterprise Information Portals); OSs are primarily used for facilitation of communication, agenda planning, and secretarial work (examples are software for preparing texts, electronic diaries, electronic mail, voice mail, planning programs).

Management level

At this level the most important question to be answered is: How is the organisation performing? Therefore, support is needed by means of systems for monitoring, controlling and decision making. Two categories of systems are available. Management Information Systems (MISs) for repetitive and routine decisions, and Decision Support Systems (DSSs) for unstructured and ad hoc decisions.

Strategic level

At this level management is focusing on strategic issues and long term trends and signals. The systems used are categorised as Executive Support Systems (ESSs). ESSs are flexible and used for non-routine issues and problems for which not only information from various sources (internal and external) is used but for which it is also needed to use human inputs like assumptions, and personal insight of the manager.

Developing transparency in the organisation about the availability and use of the various information systems should be built into the key processes and should start with making the operational level systems visible to facilitate the operational process. In the next stages of service map development, systems at higher levels should also be included.

Methodology

The research has been focused on the application of the Service Blueprinting concept and at the same time expanding this concept by incorporating information systems. Therefore, this research has an experimental nature and aims at developing insights into the usefulness and costs of incorporating information systems in Service Blueprinting.

A case study approach is most appropriate for this kind of experimental research (Yin, 2002). More specifically, a small organisation has been chosen, because the extended Service Blueprinting concept offers a low cost approach which is very important for small organisations.

The case study was developed through the following steps (Gummesson, 1990; Shostack, 1981; George and Gibson, 1991):

- Identifying the goals of management of the organisation

- Developing transparency in the key processes through the use of Service Blueprinting
- Incorporation of the information systems into the blueprint
- Identifying the effects of the use of the extended blueprint

The development of the blueprint has been done by means of interviewing managers and employees and by involving them in group discussions around parts of the service maps in which one is involved. After each of the four steps, a feedback session with the management team has been organised in order to validate the gathered information and to test the research findings. In the next section the steps will be described in detail after the case study organisation has been introduced.

Case study

The Company

Object of the case study is Modus Vivendi, a Dutch company focusing on solving peoples financial problems. Since 1985, the company offers a number of products to its customers, such as negotiation between creditor and debtor, education, debt management, and governing of a legally based debt-programme. Modus Vivendi is the largest governor of the legal debt-programme in the Netherlands. A debt-programme lasts three years, and during this period the finance of the debtor is controlled and governed by the company. During those years, the debtor has to make his or her living with 95% of the minimum wage-level. Everything he or she earns above this level will be collected on a frozen account governed by the company. After completion of the programme, the total amount of money on the frozen account is divided between the creditors of the debtor. Debts that remain unpaid because of insufficient money on the frozen account will be remitted. Only 10 employees govern these programmes for over 1,300 persons. Benchmark inquiries showed that the average proportion is 1 to 30. As the margins are small, the only way to keep up business is to work as efficient as possible. Streamlining the business processes is essential to survive in this business sector. Besides

that, the law formulates strict requirements of the outputs of the organisation. So, the business processes have to be designed in order to match these requirements in an efficient manner.

The goal of the study was threefold. First of all, the company needed a clear view of their business process. Secondly, they wanted to manage their information systems more adequately. Finally, the management expressed the need of an advanced management information system that is able to control the business process efficiently and effectively. These goals have been achieved by developing a blueprint of their processes and use of information systems, and by the creation of a performance measurement system.

Development of extended process maps for the case organisation

Step one of the research covers the first goal to make the business process transparent. Using the Service Blueprinting technique. The complete business process has been divided into thirteen process parts, each covering a specific part of the business process. As an example, figure 3 shows process part 4. Each step within a process part has been visualised by means of symbols. Each symbol corresponds with a specific step in the process: e.g. (possible) action, event, choice, intervention of court of justice.

Figure 3: Example of a process map

As shown in figure 3, the actors are lined up vertically on the left hand side of the map. The main parties are stressed by placing them in a box; the functions within a party have not been placed in a box. The (invisible) timeline starts at the left and moves to the right of the map. In process part 4 the process of reporting the status of the debtor at the beginning of the legal debt-programme to the court is shown. The governor of the debtor prepares the report. If he finds reasons to terminate the programme (i.e. the debtor, unfaithfully, has kept money outside the frozen account), he will send a termination request to the court. Otherwise, the report will be send to the court, and the judge will determine the amount of money the debtor

is free to spend on a monthly basis (this amount is indicated by the Dutch acronym VTLB). After the reaction of the judge, the secretary of the company will send a notification to the debtor and his employer, in which the VTLB is stated. The employer is asked to deposit the portion of the salary that exceeds the VTLB directly on the frozen account. Finally, the governor will ask the bank to make the private bank account of the debtor available for use again.

Step two of the research addresses the stocktaking of the information systems in use. Each information system is described with respect to functionality, role, capacity, and type. By doing so, it is possible to discover the opportunities for using the systems more efficient and for using the systems to make the business process as a whole more efficient and effective. Possible connections between separate information systems were also recognised. Finally, the stocktaking resulted in the acknowledgement that some important types of information systems were lacking in the organisation.

Step three of the research focuses on the investigation of the role and use of the information systems, and the visualisation of the role of systems within the business process. The previous step handled about the identification and characterisation of the existing information systems in the organisation. The next phase in the research is to place those systems within the business processes of the organisation. Stated differently, the role and use of the systems within each specific step of the process has to be made clear. The question ‘how can we visualise the role and influence of the information systems on the business process?’ arose. The answer is to merge the map of the business processes with the visualisation of information systems. The most appropriate way to reach such a merger is to integrate the use of the systems in the existing process map. The result is shown in figure 4.

Figure 4: Example of an extended process map

The information systems are linked to the process boxes in which they are used. In process step 4.1 the governor of the debtor uses five different information systems in order to prepare an accurate report about the status of the debtor. By depicting the simultaneous use of these systems, connections between them can be made and, by doing so, a more efficient use of information systems in the organisation can be realised. The identification of technological bottlenecks has also been made clear by the process map. Which information system is crucial to the process? The focus can be on the information system that is most used in the process, or it can be on the information system that is facilitating the most important step of the process. After identification, the crucial information system can be reviewed critically to widen the technological bottleneck. Another issue raised by the process map is whether an information system is used in a proper way. Are there better alternatives to be used in that specific process step? How efficient are the employees coping with the information systems?

The fourth step of the research has its main focus on the identification of measurement points in the business process. This phase of the research consists of the identification of critical process steps and the information systems that are playing a role in the fulfilment of those steps. A criterion for each bottleneck has been defined. The trick is to use the existing information systems for measuring the actual performance on those critical points in the business process. The management will be able to monitor the performance on a regular basis and can respond very quickly to urgent situations. Stated differently, the systems are used to serve as a new measurement tool. In addition to the use of information systems, the measurement points can be made visible through the process map. By doing so, interoperability between information systems and the measurement systems are also revealed.

Figure 5: Measure points within a process map

Step five forms the design of a performance measurement system. Measurement will be done from five different perspectives: financial, customer, internal business process, innovation and learning, and employee.

This research gathers new insights in the use of process maps, generates a new sophisticated measurement tool for the researched company, and combines information systems with management control and process management.

What are the results and effects for the company?

The approach as described here has a direct effect on the efficiency and effectiveness of the use of information systems in the various steps of the business process. Employees and managers who have been involved in the discussion about the development of the extended maps have immediately seen opportunities for improvement in the use of the information systems. Once the defects have been solved, employees should find less mistakes and errors in relation to the use of information (systems) in the business process.

The long-term effects will therefore be measured through customer and employee satisfaction surveys and interviews. However, because those measurements are done on a regular (yearly) basis, no hard data is yet available.

In the interviews with the management team it has become quite clear that their perceptions are very positive, as evidenced by the following comments:

- "Suddenly, we found out that a number of information systems were stand alones instead of working with each other! Now, we have matched the information systems and as a result achieved more efficiency in our business process. We only have to feed one system, which will feed the others, instead of feeding them all separately. Besides that, the systems are working faster, because the demanded actions require less capacity of them."
- "By viewing our business process as thirteen blocks, we decided to divide the activities of our employees in those different blocks. So, employee A specialises in

the activities required for process part 1, employee B in the activities required for process part 2, and so on. This resulted in a great boost for the efficiency of the working process and the productivity of our employees."

- "The extended process map makes it possible to share knowledge with every person in the organisation about the business process, how things have to be done, and which information systems are available. It is a very didactic instrument, which helps new employees to integrate much quicker than before the existence of the map."

Discussion and conclusion

The advantages of adding information systems to the business process maps can be summarised in the following way:

- Better insight in what is used at what moment by whom
- More efficient use of information systems and, therefore, of information
- More transparency in what information is needed in specific steps of the processes
- Less costs of data gathering and data storage because data is stored only once
- Reduction of throughput time because it is easier to know what information is needed from which system
- Identification of technological bottlenecks
- Interoperability between information systems and measurement systems

The case study described in this paper clearly shows that a process mapping concept with the inclusion of the role of information systems, can easily be implemented without high costs. However, the findings are based on a single case. In order to be able to generalise the findings, more case study research is recommended in this field. Follow-up case study research also should specifically focus on the characteristics of the organisations for which the extended process mapping approach is successful.

For what type of organisations would this approach be helpful? Based on the experiences so far, it is suggested that organisations with the following characteristics will find it very useful to use the extended process mapping technique:

- Organisations where a need is felt to make things more transparent and to streamline activities and processes
- Organisations that are at a certain stage of development will profit more than others. Especially the small and medium sized companies will appreciate the simplicity of the tool and will also have a need for less expensive tools. Larger companies might need and prefer to implement software (SAP, Oracle, Baan etc.) to be used company-wide and will also have the money needed for such investments.
- There should always be a driver for change and improvement. Besides the motivation of management, other drivers will certainly stimulate the successful implementation of the extended process mapping tool. Other drivers might be: demanding customers, rules of law, risk management etc.
- Service organisations quite often are lagging behind manufacturing in the way they have developed process knowledge.

The company in this case already had a strong regime over its processes based on the rules of the law. Also the company feels high pressure to control its processes and become as lean as possible, because the margins are low and costs have to be reduced to stay competitive and to survive in this market. So, management and employees are very much willing to cooperate and support this type of changes in the organisation and changes in the way of working. Moreover, the company is in a stage of development that can be defined as moving from pioneering towards growth and more structure. In this stage, there is an extra argument for management to know its processes in detail and have a high level of control over its processes and information flows. Take-over of competitors might be an interesting option especially

when you are able to improve efficiency and effectiveness of their processes by imposing your own approach.

So, concluding from the reasoning above, it is expected that process mapping, combined with the role and use of information systems, is a good starting point for small and medium sized enterprises and also for service organisations that are trying to develop a clearer and specific quality improvement approach with a focus on organisational development. More case study research is needed to clarify the conditions (e.g. size of the organisation, driver for change and improvement, business sector) under which the extended process mapping approach as described in this paper is most useful.

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References

Corbitt, G., Wright, L. and Christopolus, M.(2000), "New Approaches to Business Process Redesign: A Case Study of Collaborative Group Technology and Service Mapping", *Group Decision and Negotiation*, Vol. 9, No. 2, pp. 97-107.

Dale, B.G., Van der Wiele, A. and Williams, A.R.T. (2001), "Quality - Why do organisations still continue to get it wrong?", *Managing Service Quality*, Vol. 11, No. 4, pp. 241-248.

Deming, D.E. (1982), *Out of the crisis*, Cambridge University Press, Cambridge.

George, W.R. and Gibson, B.E. (1991), "Blueprinting: A tool for managing quality in services", in Brown, S.W., Gummesson, E., Edvardsson, B. and Gustavsson, B. (Eds.),

Service quality: Multidisciplinary and multinational perspectives, Lexington Books, Lexington, pp. 73-91.

Grönroos, C. (1983), *Strategic management and marketing in the service sector*, Marketing Science Institute, Cambridge.

Gummesson, E. (1990), "Service design", *Total Quality Management*, Vol. 2, No. 2, pp. 97-101.

Gummesson, E. (1991), "Truths and myths in service quality", *International Journal of Service Industry Management*, Vol. 2, No. 3, pp. 7-16.

Juran, J.M. (1988), *Juran on planning for quality*, The Free Press, New York.

Keleman, M.L. (2003), *Managing quality*, Sage Publications, London.

Kingman-Brundage, J. (1991), "Technology, design and service quality", *International Journal of Service Industry Management*, Vol. 2, No. 3, pp. 47-59.

Laudon, K.C. and Laudon, J.P. (2002), *Management information systems: managing the digital firm* (7th edition), Prentice Hall, New York.

Lehtinen, U. and Lehtinen, J.R. (1982), *Service quality: a study of quality dimensions*, Working paper Service Management Institute, Helsinki.

Lewis, B.R. (2003), "Managing service quality", in Dale, B.G. (Ed.), *Managing quality* (4th edition), Blackwell, Oxford.

Liautaud, B. and Hammond, M. (2001), *E-business intelligence; turning information into knowledge into profit*, McGraw-Hill, New York.

Lin, F.-R., Yang, M.-C. and Pai, Y.-H. (2002), "A generic structure for business process modelling", *Business Process Management Journal*, Vol. 8, No. 1, pp. 19-41.

O'Brien, J.A. (2000), *Introduction to information systems; essentials for the internetworked enterprise* (9th edition), Irwin McGraw-Hill, New York.

Patton, W. sr. (2002), "Use a map, not a hammer", *Quality*, Vol. 41, No. 6, pp. 34-36.

Redman, T., Snape, E. and Wilkinson, A. (1995), “Is quality management working in the UK?”, *Journal of General Management*, Vol. 20, No. 3, pp. 45-59.

Ritchie, R., Marshall, D. and Eardley, A. (1998), *Information systems in business*, International Thomson Business Press, London.

Shostack, G.L. (1981), “How to design a service”, in Donnelly, J.H. and George, W.R. (Eds.), *Marketing of services*, American Marketing Association, Chicago

Shostack, G.L. (1984), “Designing services that deliver”, *Harvard Business Review*, Vol. 62, No. 1, pp. 133-139.

Shostack, G.L. (1987), “Service positioning through structural change”, *Journal of Marketing*, Vol. 51, No. 1, pp. 34-43.

Sousa, G.W.L., Van Aken, E.M. and Groesbeck, R.L. (2002), “Applying an enterprise engineering approach to engineering work: A focus on business process modelling”, *Engineering Management Journal***,** Vol. 14, No. 3, pp. 15-24.

Taylor, F.W. (1911), *The principles of scientific management*, Harper and Bros., New York.

Tseng, M. M., Qinhai, M. and Su, C.-J. (1999), “Mapping customers' service experience for operations improvement”, *Business Process Management Journal*, Vol. 5 No. 1, pp.50-64.

Yin, R.K. (2002), *Case Study Research: Design and Methods* (3rd edition), Sage Publications, Thousand Oaks.

Zeithaml, V.A., Parasuraman, A. and Berry, L.L. (1990), *Delivering quality service; balancing customer perceptions and expectations*, The Free Press, New York.

Figure 1: The structure of a service blueprint

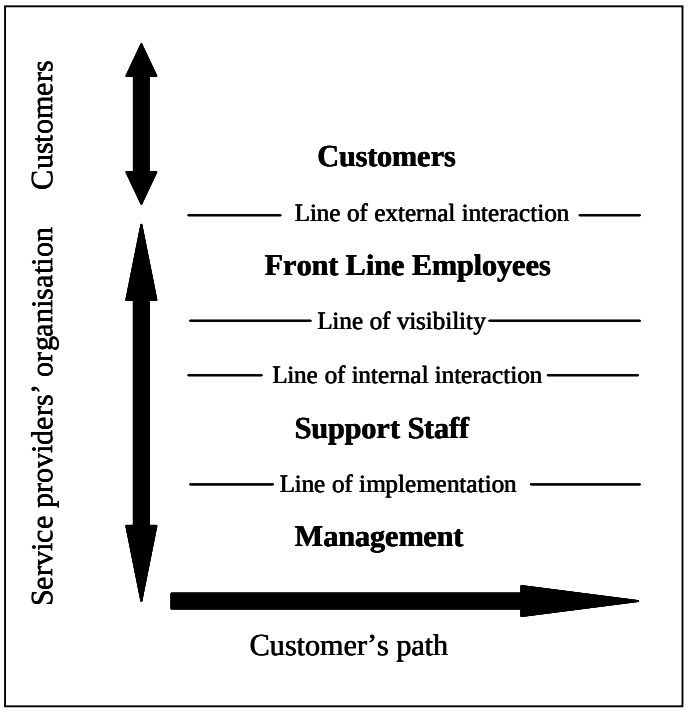


Figure 2: Information systems linked to the four organisational levels identified.

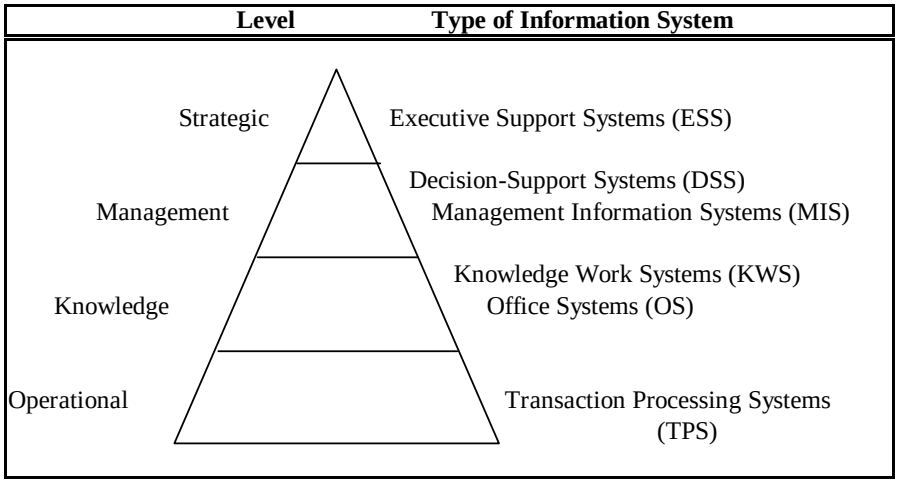


Figure 3: Example of a process map

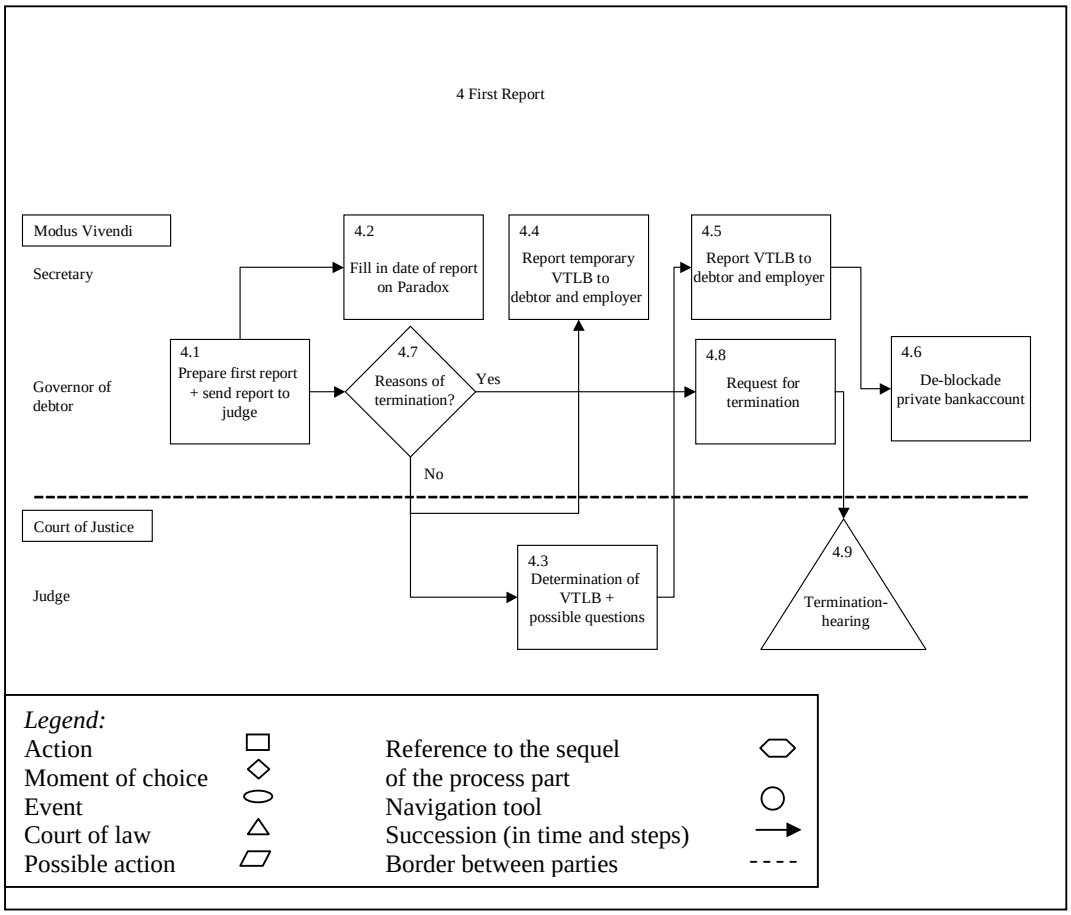


Figure 4: Example of an extended process map

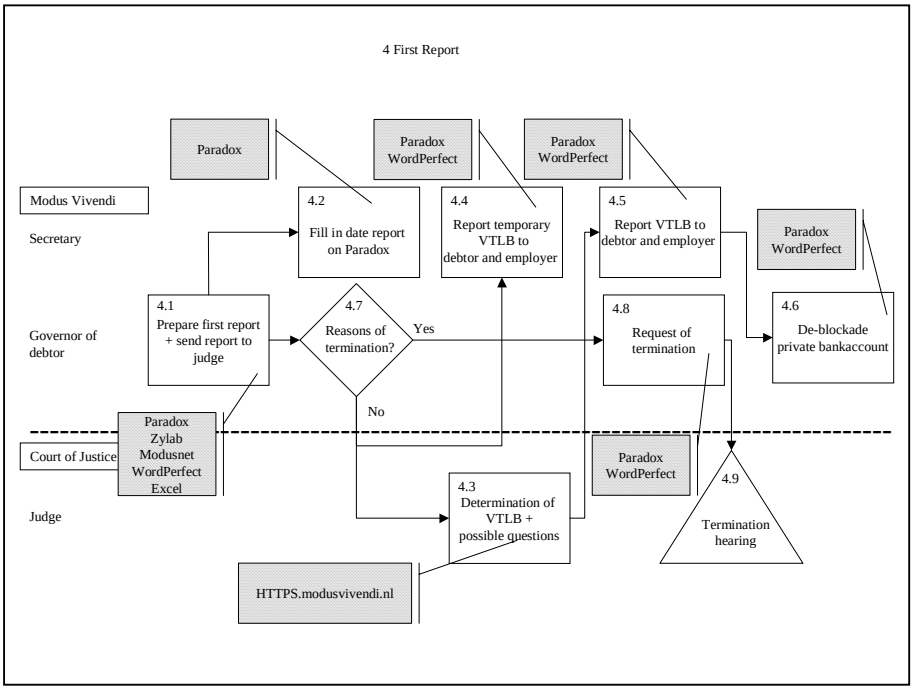
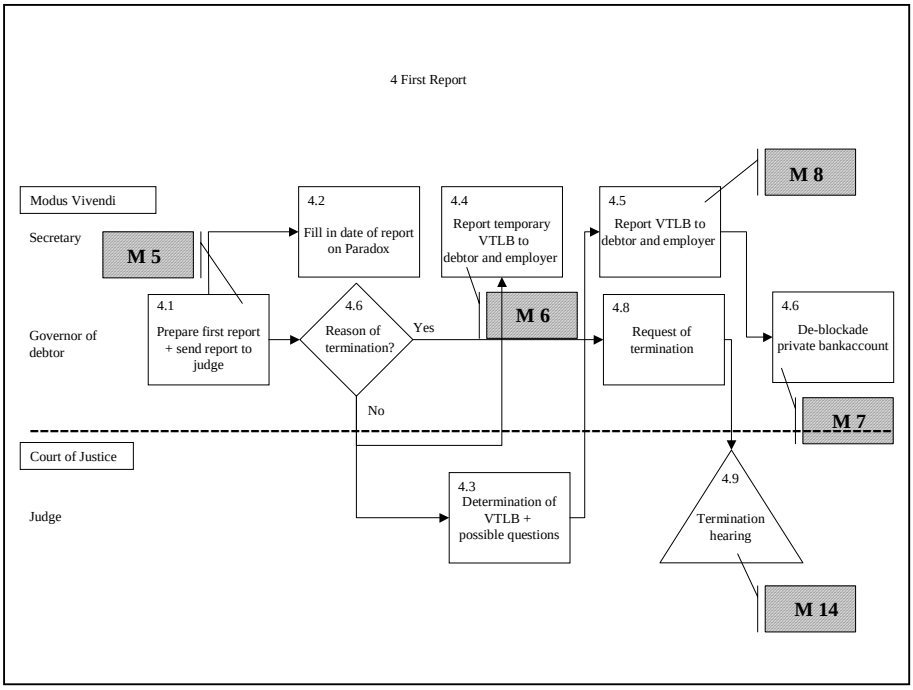


Figure 5: Measure points within a process map



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