Business Process Management in an Accounting Firm

Identifying and testing process improvements using a combination of business process management principles and a discrete-event based simulation approach

SPM5910 SEPAM Master's Thesis Project

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Preface and Acknowledgements

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Executive Summary

Accounting firms are under pressure by the market to reduce operational costs, while simultaneously the role of accounting firms in society has never been more important. Initially, most cost-reduction within accounting firms had already take place during the late nineties and early 2000s thanks to the construction and expansion of network infrastructures and the use of new audit software and groupware technology, like Lotus Notes. The recent introduction of XBRL in the financial reporting chain has enabled accounting firms to optimize their business processes by digitalization and standardization. Due to the increased market pressure accounting firms are increasing their efforts for achieving efficiency and improving business processes, but most are still unsure of how to utilize XBRL to improve their business processes.

Business Process Management (BPM) can guide decisions to improve these business processes, as it has as a central objective to enhance business performance by improving organization business processes. BPM has been successful in making organizations more agile, leaner, cost-effective, customer-focused and competitive. While the implementation of BPM in the manufacturing industry is tried and tested, the implementation of BPM in the services industry is only recently receiving more attention. Literature has also pointed out the importance for choosing the correct methodology, depending on the applicable domain, conditions, contexts and situations. For these reasons, we have created the following research questions to decide how accounting firms can improve their business processes and which (and if) BPM principles can be applied to improve the business processes of accounting firms:

MRQ_1 : Which process improvements can be recommended for the process of compiling and submitting financial statements and tax returns (CSFT), for benefiting from the advantages that digitalization and standardisation can offer?

MRQ_2 : Which BPM principles are best applicable to improve the business process of compiling and submitting financial statements and tax returns (CSFT), for benefiting from the advantages that digitalization and standardisation can offer?

A mid-four accounting firm in the Netherlands has been chosen as case study and is being viewed as representative for, at least, all other (larger) accounting firms focused at SMEs in the Netherlands. The compilation of the financial statements is an assurance related engagement, for which the accountant does not provide assurance, resulting in a limited amount of applicable regulation. Still, the accountant is adding value by issuing a Practitioner's Report, stating that the financial statements comply with the applicable standards and reporting framework. Also an accountant adds value by enhancing the quality and reliability of the information provided by the client, due to his professional expertise and diligence. The service delivered by the accountancy firm is intangible and highly people intensive in production and delivery. Moreover, the financial statements and tax returns are information products as they are heavily based upon data, information and expertise. The service and information products are most often highly customized towards the client. Due to the intangibility of the service offered and the knowledge-intensity of the business process difficulties exist with the valuation (by clients) of the technical service quality (the quality of the output of the service). Therefore, the valuation of the functional service quality (process of delivery) determines the overall service quality to a higher extent.

For the case study research, only those BPM principles that offer concrete support for identifying process improvements and are (at first sight) likely applicable to the domain and context are selected, which are BPR, Lean and Theory of Constraints. The case study concerns the sequenced business processes for compiling and submitting financial statements and tax returns for corporate

income tax. The first half of the business process is being carried out (mainly) by the accountancy department, with a review of the fiscal position in the FS of a tax specialist. After the financial statements have been finalized this is provided to the tax specialists who use this as basis for compiling the tax return. The process for compiling the financial statements consist out of more different steps and takes significantly more time than the compilation of the tax return.

For improving the process performance it is most important to achieve more cost efficiency, followed by a short lead-time and a high quality of the information products. Customer satisfaction is an important non-monetary benefit, as is mostly the case for services. Because in the case study it is very important to achieve commitment of employees for implementing changes, employee satisfaction is also included as performance indicator. Although efficiency could be calculated, for objectively valuing efficiency more indicators should be identified for explaining client difficulty. Often in accounting firms, as is the case with most service-based organizations, measuring process performance receives inadequate attention. Efficiency is only subjectively assessed on basis of their professional expertise and personal involvement with engagements. Customer satisfaction is largely determined by cost-price, followed by the time between the end of the client's financial year and the delivery of the information products, the (customer perceived) quality of the information products and the total lead-time. Regarding employee satisfaction, challenging tasks (opportunities for knowledge development due to task variety and task depth) were most important. After which the involvement with the client, autonomy and task identity are next important. Moreover, the most important constraint seemed to be that there should always be the possibility of customizing the entire product following the wishes of the client. This appeared to have a major influence on the assessment of process improvements.

Also regarding data collection and analysis serving as input for the simulation study, some challenges were encountered. For accounting firms the extent of an engagement, the amount of employees needed, the processing times and the process set-up is heavily dependent on several factors. The most important reason for this is the large variety/diversity of customers (types) and a plurality of customer characteristics that are hard to quantify. Moreover, having a people-intensive business process means that human behavioral characteristics, preferences and service-based attitudes of employees engender variability. These challenges hampered the possibilities for creating a sufficiently detailed and valid simulation model. Still, a simulation model is created using the flow-oriented language SIMAN in Arena and an animation has been created based on BPMN modeling. The simulation model was (largely) validated to be used for calculating the influence of the process improvements on the lead-time.

Subsequently, the application of the BPM principles to the case study leads to the identification of 37 possible process improvements. The case study company already applies some BPM principles (order assignment and customer teams), which are regarded as standard practice for accounting firms due to having a knowledge-intensive business process heavily depending on a large variability of clients (characteristics). Using a business expert assessment, these process improvements were validated and qualitative conclusions could be drawn using the simulation model and statistical analysis of the retrieved data set.

Process improvements should be aimed towards preventing the necessity (reduce the likelihood) of requesting additional information during compilation (1), to decrease the waiting-times for clients (2) and to support and improve the coordination activities between the two different departments (3). Identified solutions for (1) are to always carry out an intensive check on the received information, to make clients more responsible (and thus giving incentives) for delivering complete information and not to deliberately start an engagement while it is known that not all information is already available. In addition, when the client has performed his administration using Software-as-a-Service (SaaS) or another software application this gives rise to the possibility of using automated (completeness and

reconciliation) checks to decide on the completeness of the received information. Identified solutions for (2) are to request the needed data & information on a more frequent basis (the use of a SaaS solution will also provide the accounting firm continuously with more up-to-date information) or to decide if significantly poor responding customers should be rejected. Lastly identified solutions for (3) are to let the employees always use (and give unlimited access to) the planning-functionalities of the digital file application (BEAT-S) and to expand with the possibility of defining time-slots/deadlines, which can (possibly) be expanded with functionalities for automatically informing employees of progress or desired actions. Besides these most important improvements, multiple different improvements are suggested but are not explained here.

The research also showed that there are not much significant process improvements (identified) regarding XBRL and SBR. Three XBRL and SBR related improvements have been identified as significantly positive. This are the integration of the two separate business process (as in the HSA-project) due to the enhanced possibilities of sharing information between disciplines (due to SBR) and employees/departments (due to XBRL). Secondly, the possibility of relocating the completeness- and reconciliation checks towards the customer using XBRL is also a significant improvement. In addition, due to XBRL and SBR, software application developers have created more multi-purpose software applications, by which an accounting firm can reduce the amount of software applications used in the business process.

Concluding on the main research question with scientific relevance, the absence of significant constraints (compared to total lead-time) in the business process firstly meant that the Theory of Constraints was not very suitable for the CSFT process. In addition, the possibility of planning activities in the process and the existence of a case manager both ease the burden of the most likely constraint (a responsible accountant). Secondly, Lean was very helpful in identifying problems existing in the business process, but for most cases, BPR provided the solution. Thereby BPR was offering more concrete support for identifying the improvements. BPR principles concerning the customers, the information and task automation appeared to be most helpful together with an adequate interpretation of task elimination specified by Lean. Moreover, the BPR principles based upon reaping the advantages due to knowing the specific client (and engagement) characteristics are best applicable (specialization towards client characteristics and exceptions).

There obviously is a contrast between an efficient and Lean process and a high quality process, but this has to be balanced better. In some cases the process can namely be made ‘Leaner’. There also is a contrast between an efficient and Lean process using standardization and an accounting firm having to deal with a large variety and diversity of client characteristics and a high degree of process and data customization. Some standardization should be possible, but future research should identify an optimally balanced solution.

However, this research also had some limitations, for example, only the applicability of BPR, Lean (for Services) and Theory of Constraints were researched. Possibly, other BPM principles are still available and offering concrete support for identifying process improvements in the accounting domain. Above all, the case study (CSFT process) did not fulfilled to all the identified preconditions needed for successfully (using a simulation model) to apply BPM. Similar future research should critically assess the available data and likely (manually) collect the data themselves by an observation. Future research should enhance a model of measurable performance indicators to assess the efficiency of business processes in the accounting domain. Besides, future research should be able to quantify the quality of the FS and TR, and point out how to design an adequate measurement system for it. Future research should also point out how to improve the hour registration and how the correct registration by employees can be encouraged and/or obligated within any service-based organization. Lastly, a single case study analysis was used for deriving improvements and to validate them.

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Part A. Introduction

1 Introduction to Research

1.1 Background

Accountancy firms in the Netherlands have experienced a trend of digitalization and standardization of the information used in the accounting process. Some accountancy firms have recognized that this creates the opportunity to optimize and redesign their business processes. This is, among others, because it became possible to automate business processes by which increases of productivity have been achieved (Banker and Kao, 2002). But further innovation and automation of business processes is still possible and moreover necessary for an accountancy firm to keep making profit (Hooijdonk, 2012, Harmsel, 2011).

The automation of business processes of accounting firms has already begun in the late nineties and early 2000's. This was, among others, due to the construction and expansion of network infrastructures and the use of new audit software and the groupware technology Lotus Notes by accountancy firms (Banker and Kao, 2002). Besides the use and expansion of (new) information technology, the introduction of eXtensible Business Reporting Language (XBRL) in 1998 by Charles Hoffman (as member of the American Institute of Certified Public Accountants, AICPA) has resulted in further standardization and digitalization. XBRL is a new standardized business reporting format to communicate financial information (Roohani et al., 2010) with the fundamental idea to allow for a conceptual and physical separation of reporting facts from reporting meta-data (Spies, 2010). The objective of XBRL is to facilitate the business reporting process and improve financial reporting for providing stakeholders with timely information and information transparency (Roohani et al., 2010). XBRL has been identified as an important initiative shaping the future of the profession of public accountants and financial executives (Baldwin and Trinkle, 2011) and many predictions have appeared on the radical impacts it may have on business and the accounting profession (Cohen, 2004, Trites, 2004, Wagenhofer, 2003). Besides cost savings, implementing XBRL into the organization can also achieve greater efficiency and improved accuracy and reliability (Yang, 2011, Burnett et al., 2006).

The adoption of XBRL in the Netherlands has taken a long time since its introduction in the Netherlands in 2002 (Lekkerkerker, 2011, Nivra et al., 2010). Dutch professionals state that the slow adoption is mainly due to the lack of control and guidance for XBRL by the government (Boxmeer, 2010b). Only recently the automation of business processes and the implementation of XBRL in The Netherlands seem to accelerate (Boxmeer, 2011), which is mainly due to the mandatory use of XBRL for submitting financial tax returns to the Tax and Customs Administration (from the 1st of January 2013) and its consequences for digitalization and standardization (Boxmeer, 2010a). A possibility is to bolt-on XBRL in the end of an organization's business process(es), namely at the moment of submitting a financial statement/declaration to another (governmental) organization. But some accounting firms have also realized the opportunities XBRL can offer for improving their business processes by embedding XBRL into their organization, in particular for internal business processes of an accounting firm for compiling and submitting financial statements and tax returns (Boxmeer, 2011, Cheng, 2011, Harmsel, 2011).

Related to XBRL is the Standard Business Reporting (SBR) Program of the Dutch Government. It was started in 2004 as the Dutch Taxonomy Project (NTP) and it is a public-private cooperation aiming to reduce the administrative burden for companies, by providing a standardized data representation format (XBRL), semantics and secure electronic infrastructure for filing official reports (Bharosa et al., 2011). Thanks to this (unique) project, the creation of the taxonomy is organized such that

synchronization and reuse of the taxonomy and its elements is achieved between the different governmental agencies, by which it becomes possible for companies to reuse data more easily and integrate business processes aimed at reporting to different governmental agencies.

1.2 Research problem

The problem for many accounting firms is that they are still unsure of how to adapt to the digitalization and standardization to design and arrange (automated) business processes and specifically how to utilize XBRL in their business processes. This is shown by the low adoption and small expertise of XBRL. Besides, KPMG (2008) has stated that they have concerns regarding the implementation and adoption of XBRL due to overall lack of awareness and knowledge about XBRL and a lack of available software for creating and analyzing XBRL documents that are intuitive and easy to use. Companies are not sure of how to design and arrange the process of creating XBRL documents and scientific research towards the arrangement and implementation of these processes is scarce (Janvrin and Mascha, 2010). Janvrin and Mascha (2010) have also pointed out that guidance is needed for business professionals to lead them through the process of creating XBRL instance documents.

The problem is comparable with the automation theory of a *Fordist* production system, where prior standardization of materials is required for the materials to be assembled in the line, of which the work is also standardized (Oliveira, 2012). This is similar to the process for compiling and submitting financial statements and tax returns, where the existence of the standard XBRL is making prior standardization of the information in a business-reporting format possible. However, it is yet unclear for most accountancy firms how this prior standardization of information could best take place, and what its influence will be on the (standardization of the) work process, performed tasks and information used (Boxmeer, 2011, Nierop, 2011).

For changing (and designing new) business processes multiple theories exist, which are defined in this thesis with Business Process Management methods or principles. Harmon (2010) describes BPM as consisting of three major process traditions: the management tradition, the quality control tradition and the IT tradition (see figure below).

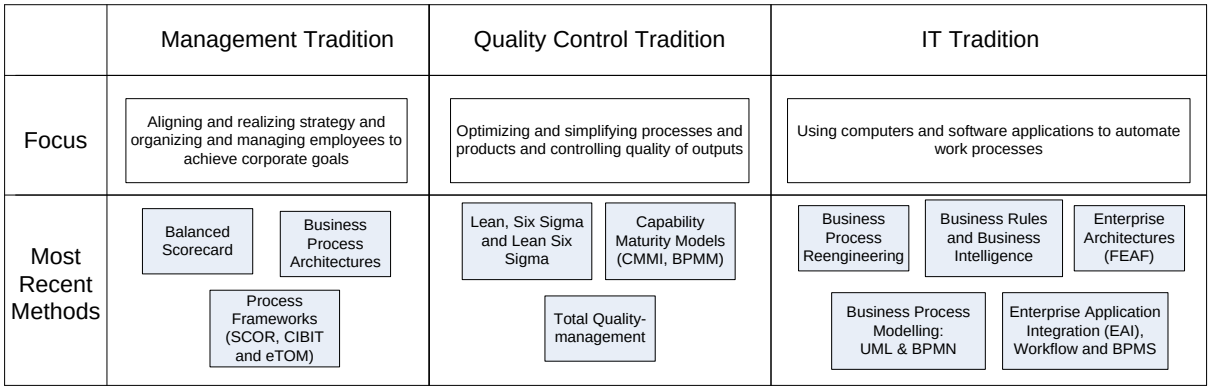

Figure 1: Three BPM Traditions and Most Recent Methods (adopted from Harmon, 2010)

As explained in the analogy with a *Fordist* production system, prior standardization of the process inputs is also necessary for the process of compiling and submitting financial statements and tax returns together with the standardizing of the process itself. Methods within the quality control tradition are focuses on this aspect. Besides that, methods within the IT tradition are also applicable to the research problem, because in both cases it is about automating business processes.

Not all methods mentioned in literature are immediately applicable to all domains, as for instance methods within the quality control tradition and within the management tradition are (traditionally) mostly used for manufacturing (Hsieh et al., 2012, Harmon, 2010), while the IT tradition grew rapidly in the 1970's with an emphasis on automating back office operations (Harmon, 2010). But more recently, quality control methods (specifically Six Sigma) are also being applied to (financial) services and are receiving a lot more attention (Hsieh et al., 2012). Because multiple BPM methodologies exist which all have different backgrounds and focus on different areas, it is important to make a correct choice for a methodology. Literature describes that this often depends on the applicable domain, as well as certain conditions, contexts and situations (Sousa and Voss, 2008, Mohammad et al., 2010, Mansar and Reijers, 2007). Besides, Hsieh et al. (2012) and Johannsen et al. (2011) specifically mention which problems can be expected when applying BPM with a strong focus on quantitative techniques to service-based organizations. This problem and its implications are further explained in the second chapter. This thesis will discuss and research which BPM principles are best applicable to guide the implementation of XBRL (and digitalization and standardization in general) in the accountancy domain. For being able to achieve the desired outputs a case study is used, which is explained in the following paragraph. After this case study, the research scope, questions and methods are presented.

1.3 Case Study

Firstly, following Eisenhardt (1989), case study research is appropriate when existing literature and empirical observations on the subject matter are scarce and research is explorative rather than aimed at testing theories. Because literature on using BPM principles in knowledge-intensive business processes to guide the utilization of data-standardization formats (in the financial services industry) is scarce, a case study research approach is more appropriate for providing initial answers to these research questions.

Like most accounting firms, the case study company is in the process of implementing XBRL and redesigning their business processes. The case study company is an accounting firm focused at SMEs and has 19 offices spread throughout the Netherlands. A partner, who is both manager and owner of that part of the organization, leads each office. A first overview of the organizational structure of the case study company, including the different departments and their activities, is as follows:

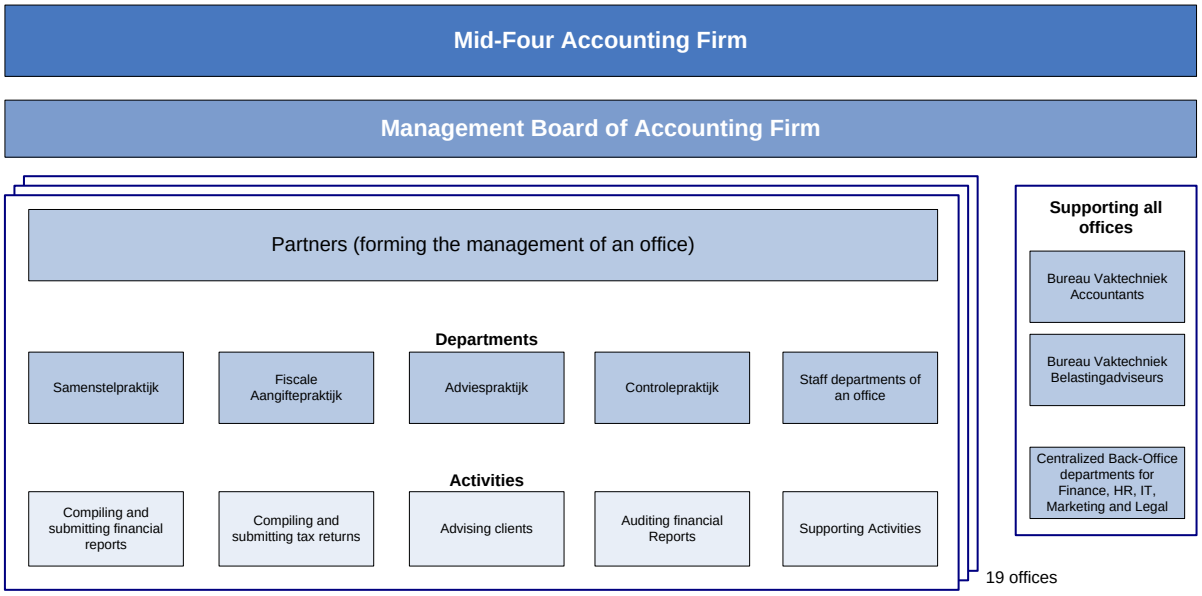

Figure 2: The organizational structure of the case study company

To adapt to external changes the case study company started the 'Herpositionering van de Samenstel- en Aangfitepraktijk' (HSA-) project. These external changes are the introduction of a law ('Wet Samenval' introduced in 2008) that allowed small legal entities to base their financial statements on fiscal grounds, the introduction of a financial statement-model on fiscal grounds by the Dutch Taxonomy Project, XBRL & SBR and pressures of competition. The intended result of the HSA-project is to achieve the situation in Figure 3.

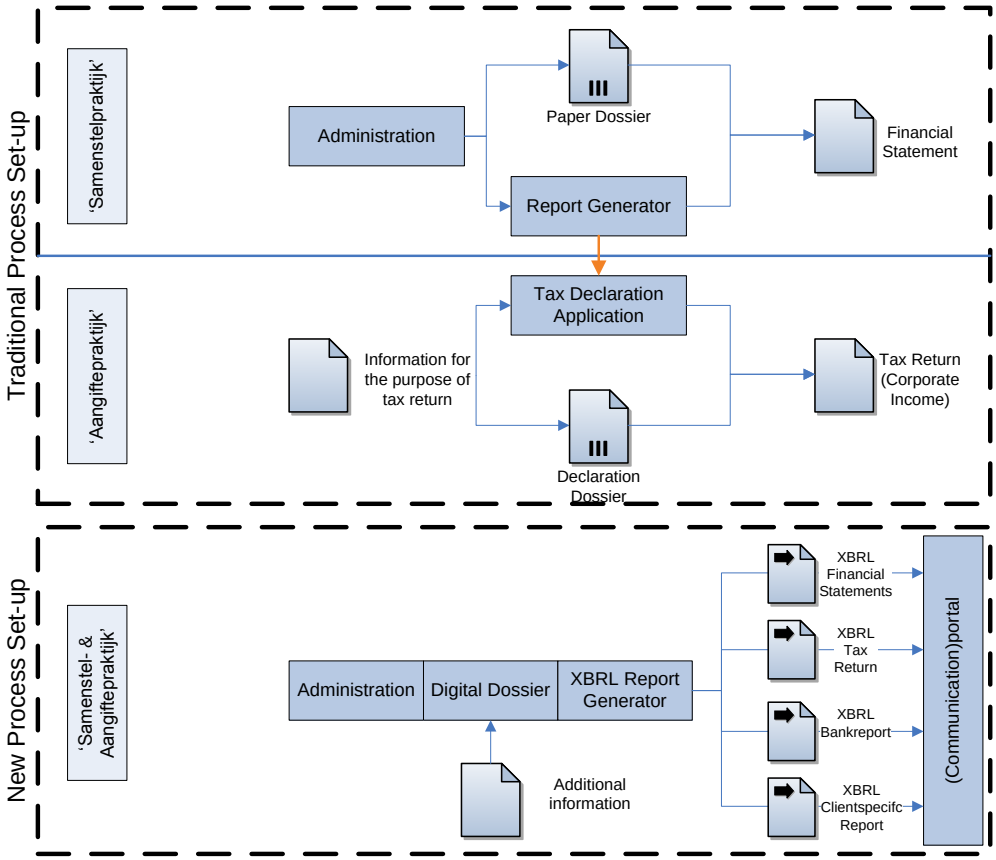

Figure 3: Traditional and New Way of Working (adopted by Verkade and Lok (2011))

The goal of the project is to integrate the two initially separate departments and their business processes. The project has already led to the implementation of a computer system, called BEAT-S into the 'samenstel' and 'aangifte' departments, which goal was to create an electronic application for efficiently, and by following a uniform norm of quality, compiling financial statements, tax returns of corporate income tax and other reports on behalf of granting organizations.

Currently, the case study company is experimenting with (further) standardizing and automating the business process for compiling and submitting financial statements and tax returns. However, the company is experiences some challenges with the implementation of changed and integrated business processes and departments. These are partly technical difficulties, which arise due to the implementation of new information technologies and their integration with old(er) information systems and technologies. But some difficulties also (have) arrive(d) due to the resistance of some employees towards making changes, which can be overcome by sufficient commitment of the management of the different office(s).

The case study company wants to test if their already proposed process improvements will have the expected influence on business performance and if they are benefiting of all advantages that the digitalization and standardization (and especially XBRL) can offer. While some efficiency already

seemed to be gained, the case study company wants to test the precise gain of efficiency able to achieve with the project and believes that a further optimization of the business process is still feasible.

The research problem was that many accounting firms are unsure of how to adapt to the digitalization and standardization to design and arrange (automated) business processes and specifically how to utilize XBRL in their business processes. For the 'Samenstelpraktijk' and 'Aangiftepraktijk' this specifically means how to design and arrange the business process for compiling XBRL instance documents for the Financial Statements and the Tax Returns. When taking the case study company as case study for this research problem, it means that they are comparable to the domain of (small- and medium sized) accountancy firms. At least, when taking the initial situation before the integration of the two business processes/departments into account. Their already proposed process improvements are thus a possible implementation/utilization of XBRL and their expected influence on business performance can be researched. It can also be researched if the process improvements lead to the situation in which all advantages of digitalization and standardization (especially XBRL) are utilized. Moreover, new possible process improvements can be researched.

1.4 Research Scope, Objective and Output

The research will only focus on the process as displayed in Figure 3. Moreover, it will include the accounting/bookkeeping step and will therefore describe the process with the following shown input and output.

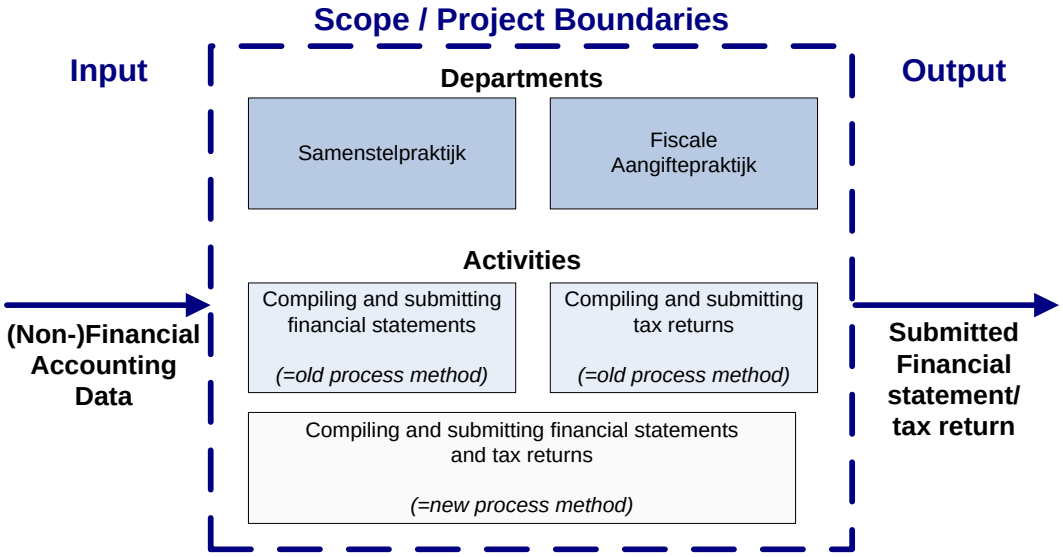

Figure 4: Description of Process and Research Scope

The main objective of the proposed research is to recommend process improvements for the aforementioned process. The expected output will therefore firstly consist of the measured performance of the current (as-is) process with identified issues, bottlenecks and causes of defect. Secondly, a design of tested process improvements will be suggested, together with their expected performance on identified measures. Thirdly, recommendations are stated for identifying and deciding on the best process improvements, together with recommendations for their implementation.

As testing process improvements and changes in real-life is time- and money consuming it is not suitable for this research. Therefore, simulation of the business process is a more adequate method.

Simulation is namely a methodology used to imitate a real system or process by means of a model and allows experimentation on the model, rather than on the real system or process (Bubevski, 2010). It also serves another purpose, namely that animation of the model can be used for clearly showing the process improvements and the changes it implies towards the problem owner and other stakeholders.

The aforementioned result will have a practical relevance for accounting firms as it provides them with guidelines and recommendations regarding process improvements with which they can further optimize their business process. The guidelines can form a best practice for any accountancy firm for how to deal with digitalization and standardization (and the implementation of XBRL) in their business processes. The main scientific contribution of this thesis is the identification of the BPM methodology that is best applicable to guide the implementation and utilization of digitalization and standardization formats, as explained in paragraph 1.2.

1.5 Research Questions

The main research question that follows from the research problem and objective is as follows:

MRQ_1 : Which process improvements can be recommended for the process of compiling and submitting financial statements and tax returns (CSFT), for benefiting from the advantages that digitalization and standardisation can offer?

For clarity and space-saving reasons, the concerned business process is hereinafter indicated with the CSFT process.. As the research methods proposed are a combination of BPM and simulation, the research will be structured alongside the framework of Doomun and Jungum (2008) for modeling, simulating and reengineering business processes in a cost-effective way, which is as follows:

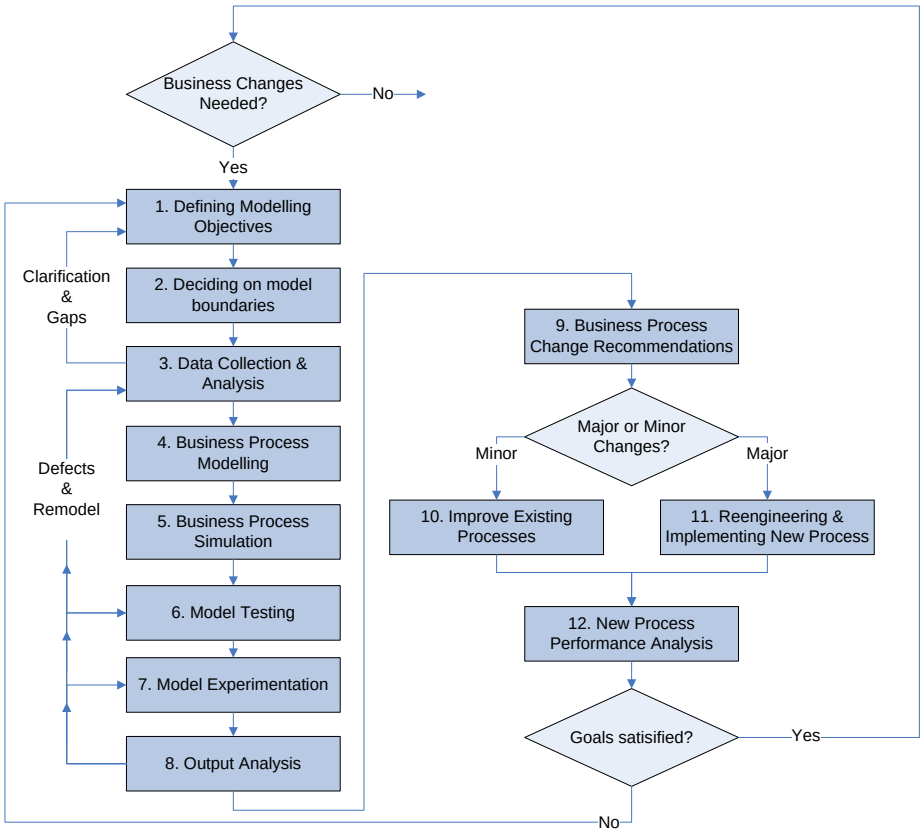

Figure 5: Framework of Doomun and Jungum (2008)

The framework shown above, mainly aims at identifying business process improvements by using the simulation model itself. However, we aim to identify the BPM principles that are best applicable for the research problem. Therefore, the process improvements will be identified using BPM methodology and tested with the simulation model. The following research question is aimed at achieving the scientific contribution:

MRQ_2 : Which BPM principles are best applicable to improve the business process of compiling and submitting financial statements and tax returns (CSFT) for benefiting from the advantages that digitalization and standardisation can offer?

Both main research questions (MRQ) are interrelated and support each other. Figure 6 shows the sub questions of this research and the number of the steps mentioned in the aforementioned framework. Steps 10 until 12 of the framework are not included in this research, as they entail the actual implementation of process improvements, which is outside the scope of this research. The figure forms than overview of this research and iterations are off course possible, as is shown in the before mentioned framework. The figure also shows the chapters (CH in the figure) of this thesis in which the research questions are answered and the used research methods.

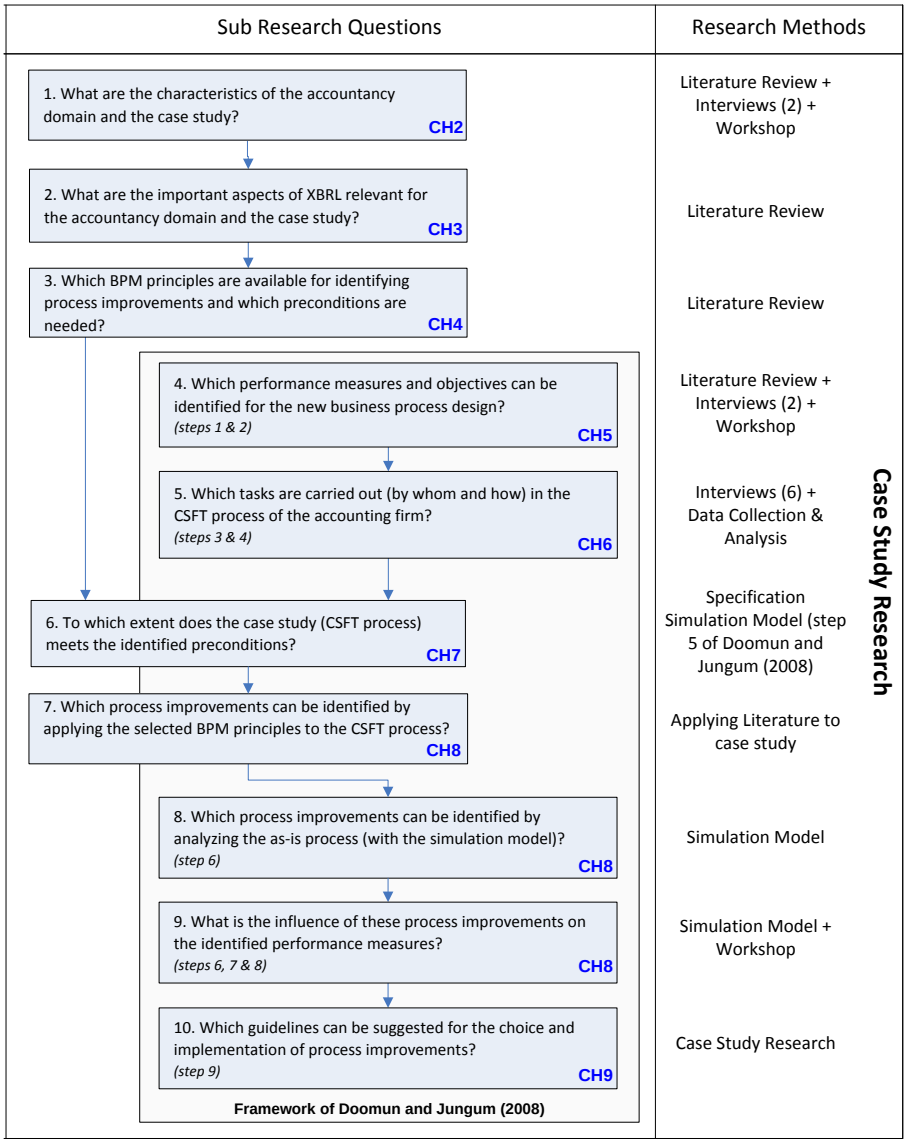

Figure 6: Research Overview

1.6 Research Methods & Thesis Outline

The chapters of this thesis follow the sub research questions as shown in Figure 6. The whole thesis is structured in three parts, of which the first is the part containing theory. This part of this thesis is (naturally) primarily based on a literature review, but is validated using interviews and the workshop. Chapter two will begin with answering RQ 1 to define the accountancy domain (and case study) and will be followed with a chapter containing the basis and (for this research) relevant aspects of XBRL (RQ 2). The subsequent chapter will begin with an introduction to BPM and will be followed by an exploration of available BPM methodology for identifying and creating process improvements. The same chapter will also elaborate on the in literature mentioned preconditions needed for successfully applying BPM and will conclude with a summary of BPM principles to be used for identifying process improvements.

Then, in the fifth chapter, when the theory has been discussed in sufficient detail, a beginning is made with the case study and the framework of Doomun and Jungum (2008) is applied to the case study. This chapter will define the model boundaries and will result in an identification of the

applicable performance measures and objectives for the new business process design. This is based on a literature review, two interviews and subsequently validated in the workshop. When these aspects are clear, chapter six will discuss the modeling of the as-is business process. For conceptualizing the CSFT process, six business experts are interviewed. Only after the conceptual model has been validated, an analysis of the hour registration is performed to retrieve the data needed to specify the simulation model. This data collection is also presented in chapter six and is followed by the specification of the simulation model in chapter seven. This chapter will therefore shortly discuss model translation, verification and validation of the simulation model. This same chapter will also discuss research question 6; the extent to which the case study fulfills the preconditions identified at RQ 3.

When the current as-is situation is completely understood and is specified in a simulation model, the simulation model and the theory from the first couple of chapters will be used in the eighth chapter to analyze the process and identify and test process improvements. Due to the discussion of RQ 6, a major part of the influence of the process improvements is based on a qualitative validation by the business experts of the workshop.

Next, chapter nine will shortly summarize the conclusions on the sub research questions and will present the answers on the main research questions. These are followed by the recommendations regarding the choice and implementation of the suggested process improvements and recommendations for future research.

Lastly, in the tenth chapter a reflection on the research process and research scope, together with a reflection on the scientific and practical relevance of the research will be presented.

Part B. Theory

2 The Accountancy Domain

The domain of this research is the accountancy domain. Accountancy is the process of communicating financial information about a business entity to users such as shareholders and managers, in which the communication is generally in the form of financial statements (Elliot and Elliot, 2004). These financial statements show in monetary terms the economic resources under the control of management. When discussing the domain more broadly, the division of (Pixley, 1900) which divided the field of accountancy into three parts is a good starting point:

1) Constructive: Is concerned with the design, reorganization and communication of the books of account.
2) Recording of transactions: Is concerned with making correct entries in books of account as have been designed for the purpose of containing them.
3) Analytical or critical: Is concerned in ascertaining the correctness of entries (or the correctness of statements prepared from these entries), either by means of periodically checking, or by means of an investigation undertaken for a special purpose.

The above classification is also stated by Goodyear (1913) and is referred to with the divisions of practical art of (1) Accounting, (2) Bookkeeping and (3) Auditing, which are more commonly used. Another important classification in the field of accountancy is a difference between management accounting and financial accounting. Management accounting is the accounting function used for internal purposes (management), while financial accounting is used for external purposes (reporting). Because financial accounting is principally aimed at providing information to shareholders (present and potential), creditors (e.g. banks and vendors), financial analysts and governmental agencies it is subject to much more regulation. For instance the body of rules called the General Accepted Accounting Principles (GAAP), nowadays the International Financial Reporting Standards (IFRS) and the Dutch "Handleiding Regelgeving Accountancy (HRA)" including the "Nadere Voorschriften controle- en overige standaarden (NV-COS)" are applicable to financial accounting (in the Netherlands). But also the Dutch Civil Code together with Guidelines and Acts/Decisions for (guiding) the implementation of laws are both applicable to financial accounting in the Netherlands

This research will be performed using a Dutch accounting firm as a case study and will therefore be predominantly focused at the Dutch (public) accounting firms. In the Netherlands a distinction has been made between four types of accountants, namely (NBA, 2010):

1) External Accountant: The accountant working for, or associated with, an accounting firm (responsible for carrying out a statutory audit)
2) Government Accountant: The accountant employed by, or associated with, an accountancy department belonging to the government or equivalent service. A government accountant is also an accountant employed by the Tax and Customs Administration responsible for the auditing of tax returns submitted by a taxpayer and an accountant directly supervising this audit.
3) Internal Accountant/Auditor: The accountant, not being a government accountant, employed by or associated with an accounting department
4) Accountant in business: The accountant who works, but not as a public accountant, internal accountant or government accountant.

2.1 Activities of an External Accountant

The process that is subject of this research is the process of compiling and submitting financial statements and tax returns, which is part of the activities of an external accountant, as can be seen in Table 1 (non-exhaustive) below:

Table 1: Activities of an Public(/External) Accountant – non-exhaustive (Dieleman, 2008)

Assurance Engagements	
Aimed at provisioning reasonable assurance	**Aimed at provisioning limited assurance**
Statutory audits as intended in the 'Wet toezicht accountants-organisaties' (Wta)	Review Engagements (of the annual report or interim figures)
Statutory audits on basis of other laws and regulation	
Voluntary audits (of the Annual Report)	
Non-Assurance Engagements	
Assurance Related Engagements	**Other Engagements**
Engagements for the compilation of financial overviews (financial statements / annual report)	Administrative Services (bookkeeping)
	Consulting and/or Advisory engagements
Agreed-upon Procedures Engagements (concerning financial information)	Transaction related advisory services
	Compilation of tax returns

A major distinction between the activities of a public/external accountant is made by being an assurance engagement or a non-assurance engagement. Assurance is defined by the provisioning of certainty of information by a neutral party to strengthen the confidence of the users of this information (NIVRA, 2009). Therefore, with assurance engagements, the accountant adds value by providing this assurance as a third, independent and trusted party. The assurance engagements are divided into the assurance engagements providing reasonable or limited assurance, of which the first results in (when assessed positively) an audit opinion ("Accountantsverklaring") and the latter in a Review Statement ("Beoordelingsverklaring") when concerning historical financial information. If it concerns another type of (financial) information, an assurance report is provided. Naturally, an reasonable assurance engagement is more extensive and involves more (obliged) procedures than the limited assurance engagements. But as been explained, the focus of this research is the CSFT process, for which no assurance (report) is provided. The compilation of financial statements is an assurance related engagement, while the compilation of tax returns is an 'other engagement'. An overview of the compilation of financial statements (/overviews) is as follows:

Table 2: Assurance Related Engagements (NBA, 2012)

Non-Assurance Engagement: Assurance Related Engagements	
Type:	**Engagement for the compilation of financial overviews**
Goal:	To collect, process, classify and summarize financial information into a financial overview, by which the accountant is involved because of his expertise in the areas of financial reporting, and not only because of his expertise in the control area. Generally, this means that the accountant converts detailed information into a manageable and understandable form without requiring that the statements in the underlying information, including statements that the information is accurate and complete, is audited or reviewed. The work to be performed is not aimed at, and do not make it possible for the accountant to, provision any degree of assurance on the fairness of a financial overview. But the users of a compiled financial overview can derive some added value by the involvement of the accountant, because he is obliged to perform his activities with professional expertise

	and diligence.
Procedures:	- The accountant is expected to have a global understanding of the nature of the activities of the entity, the way the administration is set up and the grounds of valuation and determination of results upon which the financial overview is based. - The accountant presents the by the entity delivered information in a financial overview and clarifies this on basis of the applicable reporting financial reporting framework. - The accountant should read a financial overview made by him and make an assessment whether this overview is adequately designed and free of substantive errors. - When substantive errors are identified, the accountant has to discuss with the client about the necessary changes. If these changes will not be made, the accountant should not perform the engagement anymore. - When the accountant encounters indications of fraud or illegal conduct, he must act in accordance with what is prescribed in Standards 240 and 250 taking into account the nature and scope of the engagement. The following procedures only have to be performed when the accountant identifies that the by the entity delivered information is incomplete, inaccurate or otherwise unsatisfactory: - To obtain information about the reliability and completeness of the by the entity delivered information - To evaluate or test the measures of internal control - To verify obtained information - To verify obtained clarifications
Resulting statement:	- 'Samenstellingsverklaring' / Practitioner's Report

Thus, while the checks are less thorough then when performing an assurance engagement like a statutory audit, the accountant still has to perform checks and still adds value as is stated in the table above. This added value is presented by issuing the Practitioner's Report together with the financial statements, which states that the financial statements comply with the applicable standards and the applicable financial reporting framework. The above-described process of compiling financial overviews is mostly being performed in the operational department called the 'Samenstelpraktijk' of an (public) accountancy firm, while the 'Aangiftepraktijk' is performing the compilation of tax returns. Most (larger) accounting firms in the Netherlands are structured along these and two other operational departments, namely the 'Adviespraktijk' and the 'Controlepraktijk'. The 'Controlepraktijk' is performing auditing activities and is dealing with the assurance engagements, while the 'Adviespraktijk' is primarily performing activities falling in the area of non-assurance 'other engagements' of Table 1. A narrower scope is needed to be able to specify the process into more detail, therefore the next paragraph will present and explain the process of compiling and submitting financial statements and tax returns itself.

2.2 Case study - Process of Compiling and Submitting Financial Statements and Tax Returns (CSFT process)

A global overview of the CSFT process as can be identified at the case study company, and as is representative for mostly all Dutch (public) accountancy firms, is as follows:

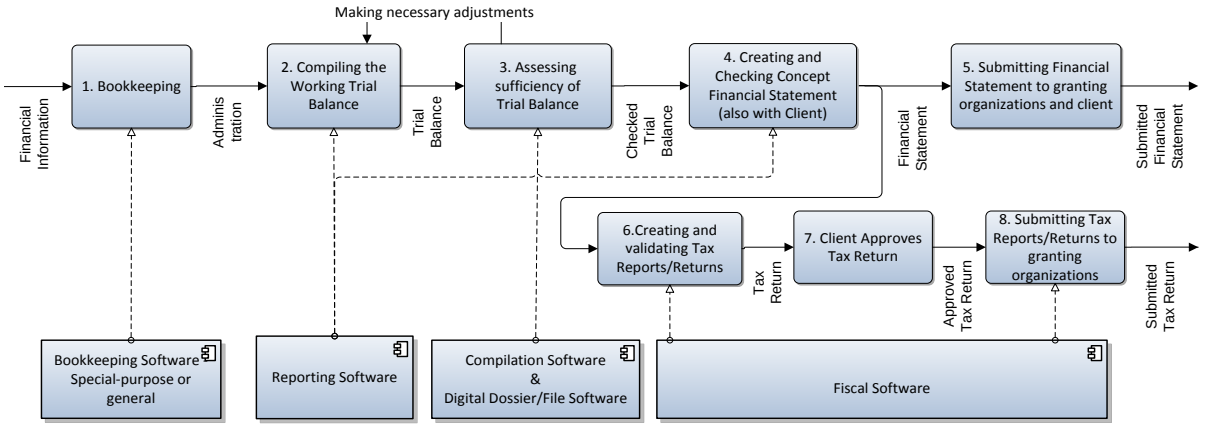

Figure 7: Global Overview of the CSFT process (simplified BPMN model)

The first step in this process is the bookkeeping step, which is performed by the client itself or by an accountant. When a client is a mid-sized company, it usually has its own administrative personnel to perform the bookkeeping. A client sometimes uses special purpose bookkeeping-software to perform its bookkeeping, but a client can also use more general kind of software, like Microsoft Excel, or just simply in paper form. Then the client hands in his administration and the accountant can start with step 2 in the process. Nevertheless, it also happens that a (small-sized) client just saves all of his documents, receipts, invoices and/or bank statements, etc. and hands these in to the accountant, for him to perform the bookkeeping.

Both possible situations deliver the information needed to be able to compile a working trial balance in step 2 of the process. This is mostly been done in a special purpose reporting software for creating financial statements and other overviews. When the working trial balance is finished, it will serve as the input for step 3 of the process, which is concerned with assessing the correctness and completeness of the trial balance and checks if it is free of substantive errors. During this step in the process an accountant spends his time on performing checks and controls and, if necessary, requests additional information needed to be able to perform this assessment. As where steps 1 and 2 are not directly knowledge intensive tasks, this step of the process requires the expertise of an accountant, as it is here where gained experience and knowledge should be used to discover and improve any mistakes made. In the Netherlands, multiple organizations have made guidelines in the form of checklists and audit programs that can be used to guide this step of the process. Larger (public) accountancy firms often make their own guidelines, like the case study company has also done. However, many professional organizations and consultancy firms design these guidelines and offer them to smaller (public) accountancy firms. This step in the process is (most often) supported by (an integration or combination of) two different types of software, namely:

1) Compilation Software: Software aimed at supporting the work process for obtaining reliable financial information/statements, which contain the self-developed or obtained guidelines (/audit program) to guide the (workflow of the) process.
2) Digital Dossier Software: Software aimed at documenting the client- and engagement files

Thus this process is most often (at larger organizations) performed digitally using two types of software. One guides the workflow of the process and the other stores all documents and information used and processed in this process, to have an audit trail available. When this step in the process is finished, the checked (and improved) trial balance is used to make the financial statements in step 4. This is often done in reporting software, which is used to create a digital or hardcopy document of the financial statements. Then, the resulting financial statement is checked internally,

but also checked by and discussed with the client. When approved by all parties it can be send towards the granting organizations and the client.

Besides, the financial statements also serve as input for compiling the tax returns. Tax specialists use the financial statements, as well as some other documents, to create the tax returns (step 6) and also perform some checks to be sure that they send a correct tax return towards the Tax and Customs Administration in step 8. For these steps, (public) accountancy firms most often use dedicated fiscal software. However, before the tax return is submitted, the tax returns are also approved (and send by post) by the client in step 7.

2.3 Characterizing the Accountancy Sector

Multiple differences exist between the (more traditional) manufacturing industry and the services industry. In addition, some characteristics are likely to be specifically inherent to the accountancy sector. The table below is created to summarize the most important characteristics of services from literature and to mention the characteristics that could be identified as applicable to the accountancy sector. This table is firstly based upon literature, but also based upon interviews and the workshop with business experts.

Table 3: Characteristics of Service-Based Organizations valid for Accounting Firms

Characteristics	
1. Intangible and not tangible products	
	'Goods' are 'Services' and 'Tangibles' are 'Intangibles' (Levitt, 1981)
	Intangible products are highly people intensive in delivery and production (Levitt, 1981)
	--> Financial Statements and Tax Returns are intangible products and highly people intensive in delivery and production
2. Information Products as specific form of Intangible products	
	Information products are based on data, information and specifically knowledge (Loebbecke, 1999)
	--> Financial Statements and Tax Returns require specific expertise and are based on data/information, thus information products
	--> Moreover an information products, because the added value of an accountant is to increase the quality/reliability of the data/information in a Financial Statement based on his expertise
3. Customization of Services	
	Service-based organizations are supposed to provide responsiveness, referring to meeting the customer demands in terms of variety of offerings, demand availability, degree of customization of services and a prompt service recovery (Tyagi, 2011)
	--> Participants in the financial information supply chain are reasonably homogenous, however participants demand high degrees of data customization (Fahy et al., 2009)
	--> (Employees of) the case study company deem the customization of the service and the contents of the Financial Statements as (very) important (Workshop, 2012)
4. Difficulties with valuing the quality of services (from a consumer-perspective)	
	Service quality is more difficult for customers to evaluate than goods quality (Parasuraman et al., 1985)
	Service quality perceptions result from a comparison of customer expectations with actual service performance (Parasuraman et al., 1985)
	Quality evaluations are not only made on the outcomes of a service (technical service quality), but also involve the process of service delivery (functional service quality) (Parasuraman et al., 1985, Grönroos, 1984). Moreover, the functional service quality is (likely to be) more important to the overall service quality than the technical service quality (Grönroos, 1983)

	--> Clients of the accounting firm find it difficult to value technical service quality, namely the quality of the data/information inside the Financial Statements and Tax Returns (Workshop, 2012, S., 2012c). This is (likely to be) mostly due to the high knowledge intensity (specific expertise) of the business process and the information products created.
	--> For the accounting firm also the valuation of the process of delivery (functional quality) is likely more important for the perception of the overall service quality than the technical service quality (Workshop, 2012)

2.4 Conclusion Accounting Domain and Case Study – Answer RQ 1

An external accountant performs the CSFT process that is an assurance-related engagement, meaning that it is not aimed at providing assurance. Here, the added value of an accountant results from the application of his professional expertise in accounting and financial reporting and compliance with professional standards (including relevant ethical requirements) and the clear communication of the nature and extent of his involvement with the compiled financial information. Because a compilation engagement is an assurance related engagement it is not directly subject to heavy regulation, but is still subject to existing standards and financial reporting frameworks (primarily NV COS 4410) prescribing some minimal procedures/checks. It also obliges the accountant to create a financial overview not containing any substantive errors. This means that (all of) the work of an accountant is aimed at increasing the quality and reliability of the information inside the financial statement. The compilation of the financial statements is a knowledge intensive task, where an accountant has to assess the quality of the financial information and improve the quality where needed. But it is also important to recognize that the NV COS 4410 regulation is principle-based, resulting in the fact that it is not always easy to decide what is wrong or right.

After the financial statements have been compiled, they can be discussed with the client and, when approved, they are sent towards the client and granting organizations. The financial statements also serve as input for the tax specialists to create the tax returns that should be sent to the Tax and Customs Administration. Tax specialists also perform some checks on the received information, although less extensive than those of the accountant. Sometimes, the tax specialists have to change figures, because the reporting system and principles used for the Tax and Customs Administrations are different from those used for the financial statements. This part of the process is also a more knowledge-intensive task and requires expertise of the tax specialist. It is also important to note that currently the case study company (like many accounting firms) uses multiple software applications in the complete business process. These are all largely single-purpose and aimed at fulfilling only one part of the business process. This is because software vendors have traditionally focused themselves to be the best of breed for a single purpose.

The CSFT process can be characterized as delivering a service by enhancing the quality and reliability of the financial information and to eventually provide the customer with (intangible) information products (financial statements and tax return). The products are people and knowledge intensive in the production and delivery of the service, as it requires specific expertise of the accountants and tax specialists. Accountancy firms, like almost any service-based organization, are supposed to provide responsiveness, which means that the accountancy firm has to meet a variety of customer characteristics and has to provide responsiveness in the degree of customization (of the contents and the process itself). Lastly, service organizations also deal with difficulties in the valuation of the quality of services, especially from the consumer perspective. The customer likely has difficulties in valuing the financial statement/tax return due to the knowledge-intensity (accountancy expertise) of the business process, meaning that the client cannot really value if they are totally correct and/or complete. It is also suggested that the process of delivery (functional quality) is likely to be more important for the perception of the overall service quality.

3 eXtensible Business Reporting Language (XBRL)

The introduction of this thesis shortly introduced XBRL as a new standardized business reporting format to communicate financial information (Roohani et al., 2010) with the fundamental idea to allow for a conceptual and physical separation of reporting facts from reporting meta-data (Spies, 2010). It was explained that it is expected to have a radical impact on the accounting profession (Cohen, 2004, Trites, 2004, Wagenhofer, 2003). This chapter will elaborate more on the contents of XBRL and its implications for the accounting profession.

3.1 Introduction to XBRL – Standardization & Benefits

XBRL is an open, platform-independent, international standard that enables the extraction, manipulation and exchange of Web-based data across a variety of software applications (Lester, 2007). It has often been compared to the business-reporting equivalent of bar coding in the grocery industry, where each product contains a unique (bar) code by which it is identifiable as a certain product and different from all products containing a different bar code. Comparable, XBRL provides an identifying tag for each individual item of data, such as net-profit (Gomaa et al., 2012). XBRL can thus be regarded as a metalanguage, because the XBRL tags provide additional information, metadata, describing the meaning of the tagged data-items (Yoon et al., 2011). Thereby XBRL provides an unambiguous meaning for the data, making it computer readable and enabling automated processing of business information by software for reasons such as analysis and comparison (Gomaa et al., 2012). The use of the standard XBRL-tags allows for the specific identification, automatic exchange and reliable extraction of financial information across different software applications without the need for conversion (Yoon et al., 2011).

Many users of financial information in the reporting chain like businesses, regulators and investors can benefit from XBRL. Benefits can be the integration of disparate business reporting procedures across business reporting jurisdictions, the reduction of compliance-costs with reporting regulations and data-quality assurance services, the facilitation of communication between businesses and financial markets (Yoon et al., 2011). But XBRL can also facilitate continuous reporting for investors or regulators on companies' operations by enabling the capture, integration, processing and reporting of financial information in common formats and can reduce costs for obtaining and assimilating information from businesses and costs associated with international business reporting standards (Yoon et al., 2011). More specifically, Pinsker and Li (2008) have researched that XBRL can lead to cost savings due to an increased data processing capability, decreased data redundancy, increased efficiency, and decreased costs of bookkeeping. Using XBRL can thus have many potential benefits for public accountancy firms. However, for being able to utilize XBRL and knowing how to implement it in a public accountancy firm, a deeper understanding of the (technical) elements of XBRL is needed. The following paragraphs will elaborate on these aspects.

3.2 XML, Specifications, Taxonomies and Instance documents

XBRL is a derivative of the XML-standard and consists out of several elements, namely XBRL specifications (extensions to XML specifications), XBRL taxonomies, XBRL extensions and XBRL instance documents. The roles and relationships of these elements are presented in Figure 8. XML was created by the World Wide Web Consortium and provides the general syntax for the XBRL specification. The following paragraphs will elaborate on the elements relevant for this research.

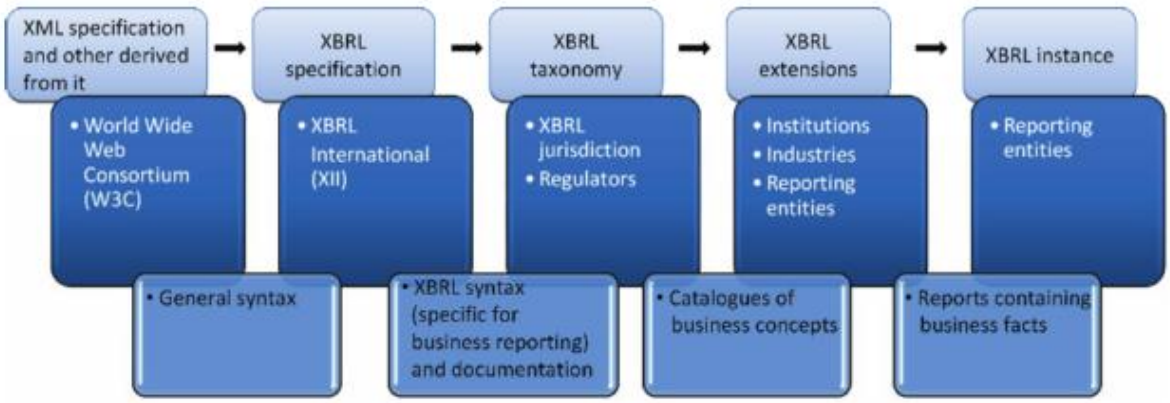

Figure 8: Elements of XBRL, Roles and Relationships (Debreceny et al., 2009)

3.2.1 XBRL Taxonomy and Extensions

The XBRL tags with which the financial information can be tagged are based upon accounting standards and regulatory reporting regimes and are defined in XBRL taxonomies. XBRL taxonomies thus reflect business concepts in form of catalogues or thematic vocabularies and map XBRL tags to corresponding financial data items, while simultaneously defining their relationships and processing rules (Troshani and Lymer, 2010).

In the Netherlands, the Standard Business Reporting (SBR) program of the Dutch Government took the role of guiding the creation of the taxonomy to be used by Dutch businesses. It consists out of three major pillars, namely the standardization and harmonization of information (taxonomy and structure), unambiguous processes (defined infrastructure like Digipoort/BIV) and the use of generally accepted standards like XBRL, SOAP and BPMN (Urlus, 2012). The set-up of the Dutch situation is depicted in Figure 9. In this figure, the XML specification (and techniques) as well as the XBRL specification are shown in a way comparable to Figure 8.

Three major XML techniques are used to create a taxonomy, which are the XML Schema Definition (XSD) to define the structure of XML documents (Valentinetti and Rea, 2011), XPointer to address structural aspects of XML (content created as a result of parsing the document) and XLink Linkbases. Linkbases based upon XLink are used for defining the semantics (reference and label linkbase), presentation (presentation linkbase) and mutual relations (calculation and definition linkbase) of the taxonomy and its elements. Formula linkbase can also be included in a taxonomy, which can be used for making more complex calculations (than simply adding numbers as calculation linkbase does) to validate existing elements and/or or for creating new elements. Moreover, the table linkbase lastly is to enhance the visual representation of XBRL documents. The 2012 version of the Dutch Taxonomy has already included the newer dimensions specification, which can be used to define dimensions dictating the conditions when, or when not, certain concepts/elements may be placed in a document or to support other new structured contextual presentation of information.

As Figure 9 also shows, in the XBRL jurisdiction of the Netherlands the taxonomy used is the Dutch Taxonomy (NT), which is based upon the recommendations and guidelines described in the Financial Reporting Taxonomy Architecture (FRTA). The NT is the base taxonomy for the Netherlands and is applicable across all domains. It contains the nl-genbase elements (financial concepts) and the nl-common-data elements (non-financial concepts) which can be used in all extensions (of the NT). Based upon this taxonomy are the extensions for the Dutch Tax & Customs Administration, for the Chambers of Commerce and for Statistics Netherlands. These are regulator/institution-specific taxonomy extensions and can thus be used for reporting to these specific institutions. The

government creates these domain-specific taxonomies, but there is also a taxonomy created by the private sector, the Bank taxonomy. It is created by the Financial Reports Cooperative (consisting out of three Dutch banks) and is a taxonomy that can be used for sending credit reports to the banks when having been granted or requiring a bank credit. This taxonomy is based upon the Dutch taxonomy and the taxonomy of the Chambers of Commerce. These elements together form the architecture of the taxonomy and are depicted in the left half of Figure 9.

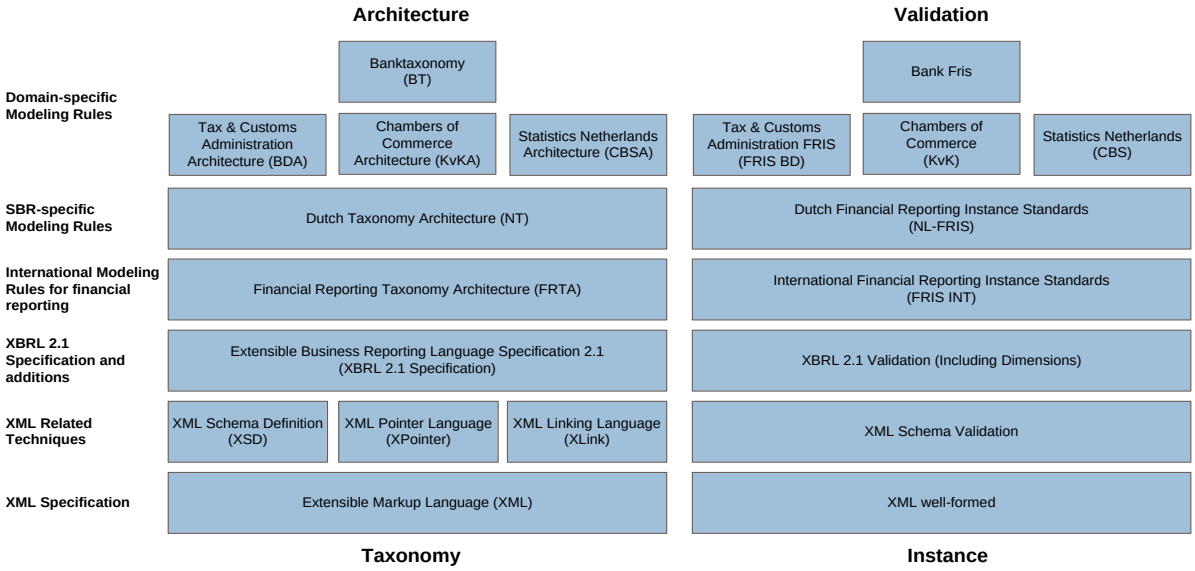

Figure 9: The Dutch Architecture and Validation Elements, adopted by Koelewijn (2012)

Concerning the case study It is important to recognize that all domains have their own domain specific taxonomy architecture. Meaning for instance that all (besides 2) of the 556 elements in a corporate income tax return are defined by the Tax & Customs administration and not reused from the nl-genbase. Besides, the Chambers of Commerce uses 118 elements of the Dutch Taxonomy of all 432 elements in a fiscal annual account for a small entity. So while both this tax return and financial statement have similar elements, like for instance intangible fixed assets, these elements cannot be simply exchanged between these documents as they have different tags (and level of detail).

3.2.2 XBRL Instance Documents

When all financial reporting items are gathered they can be tagged with the corresponding taxonomy by creating an XML-based instance document (by using software) which can be consequently sent towards granting organizations and/or the client. This instance document is comparable with the traditional paper document that was sent to, for instance, the Chambers of Commerce. As told, the taxonomies dictate for a financial report which elements it should contain. It for instance declares for a declaration of corporate income tax that there are 556 elements to be filled in about, for instance, (in) tangible fixed assets, net profit and address of shareholders.

The instance document (in machine-readable form), is the document which is sent towards the granting organizations, like the Tax & Customs Administration. In the Netherlands, the channel for submitting organizations towards governmental agencies is Digipoort, which the governmental ICT-organization Logius (for e-government) administers. For being able to submit documents via Digipoort, submitters have to possess a certain certificate ('PKI.Overheid Services certificaat') to authenticate their identity. This first has to be requested and granted by a Certificate Service Provider (CSP). An intermediary like a public accounting firm can choose to request a certificate himself, or when they use an online application (like a portal service), the software provider can

request a certificate. In addition, Logius has incorporated some additional security measures into Digipoort, like the Web Services Security (WSS) for SOAP and Secure Sockets Layer (SSL). Besides, Digipoort performs a technical validation of the submitted document and sends feedback about the result of this validation check. For sending in credit reports to the Banks (using the BT), not Digipoort but the 'Bancaire Infrastructurele Voorziening' (BIV) is used, for which the same certificate (as before mentioned) is required.

3.3 XBRL Validation

Figure 9 also shows the elements for the validation of XBRL instance documents (on the right hand side). These elements together define the architecture of the validation of an instance document for the financial reporting domain. Naturally, validation of instance documents is an important topic for public accounting firms as they want to submit valid 'reports' and are bound to standards prescribing the absence of substantive errors (a further discussion on the quality of the reports made by public accounting firms is performed in part B). This means that the elements for validating instance documents are important and are thus treated below.

For validating the (contents of the) instance documents the Financial Reporting Instance Standards rules for modeling are most important. The International FRIS (FRIS INT) defined by XBRL International contains all basic rules for XBRL instance documents, like for instance the prohibition of duplicate entries. Layered upon these international rules are the Dutch FRIS, which are the generic deviations (and rules) of the FRIS INT for instance documents based upon the Dutch Taxonomy. Then rules that are more restrictive are prescribed by the domain-specific FRIS documentations for, for instance, the Dutch Tax & Customs Administration (FRIS BD). This FRIS BD for instance prescribes which schema should be used when filing a declaration of corporate income tax or for instance the obligatory internal consistency for *duration period* and *instant period* in a given context.

In addition, Formula linkbase can be used to validate the (internal consistency of) contents of an instance document. Formula linkbase offers (complex) calculations and can be very helpful in validating documents, for instance that the initial date of the reported business facts in the instance document is not later than the final date or that the assets total equals the liabilities total. Formula linkbase can be used for value assertion (deciding if a value of an element is fulfilling the requirements), existence assertion (are the required elements present) and checking the internal consistency (by computing items from elements and comparing this resulting value with another existing element). Formula linkbase can also be used to implement business rules to validate instance documents. Koelewijn (2012) claims that 95% of the consistency rules (of business rules) can be implemented by only using five types of Formula rules, by which it is an excellent validation instrument in principle.

3.4 XBRL Implementation Strategies

Multiple XBRL implementation strategies exist and most authors make the distinction between a bolt-on, embedded and built-in approach. The different types of implementation strategies also correspond with different types of XBRL, namely Global Ledger (XBRL-GL) and Financial Reporting (FR) as is shown in Figure 10.

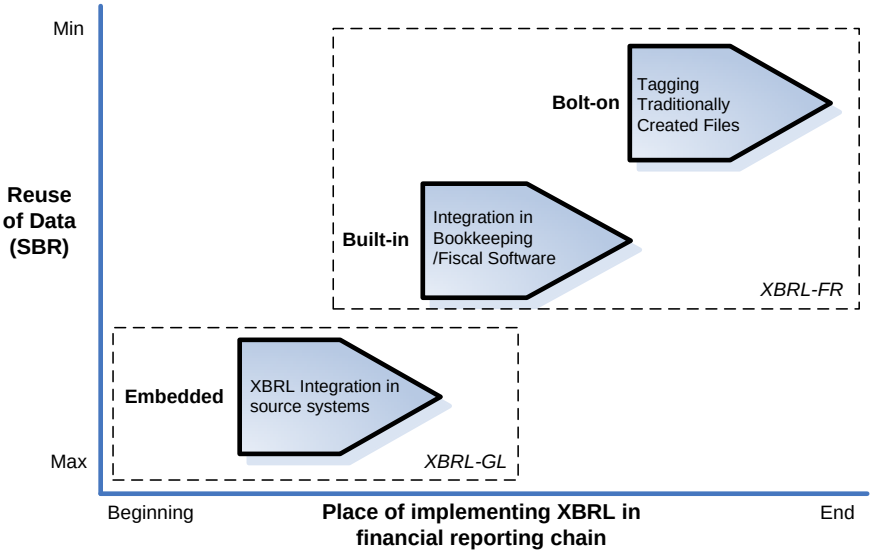

Figure 10: Implementation Strategies of XBRL, adopted by (Esseboom, 2012, Garbellotto, 2009)

In the bolt-on approach, XBRL is only implemented in the end of the processes of the submitting organization. The process that was used to create the traditional reports is still followed for creating the reports in a traditional format. Only in the end, the filings are converted into XBRL either internally, using a XBRL-FR mapping tool for the (reporting) class of accounts, or externally by outsourcing the conversion process (Garbellotto, 2009). In this way, XBRL is implemented in the least profound manner, meaning a low-cost and easy approach, but goals of SBR (standardization, harmonization and the re-use of data) and its possible advantages of cost-efficiency are achieved in the least possible way.

Another possible way is integrating XBRL into the bookkeeping (or fiscal) software. This means that the data is tagged with XBRL when they are being recorded in these applications. XBRL tagging is then (mostly) performed on the aggregated data forming the general ledger accounts. This is also a type of XBRL-FR (still on the aggregated-data level), but requires a more profound XBRL implementation resulting into higher costs. But it does make it possible to use the same tagged data for different types of reports and it gives the user control over the external reports, which isn't the case in the bolt-on approach (Esseboom, 2012).

The last option for implementing XBRL is by integrating it into the corporate systems which handle the transactions, thus also bookkeeping software, but also handle other types of non-financial information needed for financial reports (like for instance inventory levels). Where in the previous two approaches the data is tagged on an aggregated level, here the data is tagged with XBRL on a transaction-level. For tagging transactions, the XBRL Global Ledger standard can be used. Also in the previous two situations, the intermediary is mostly doing the XBRL implementation, but this strategy (often) means that the company with the reporting obligation should also implement XBRL. This strategy requires the largest investments and would take the longest implementation time. Nevertheless, it is the most ideal strategy in the vision of SBR as it means high standardization and harmonization as well as the highest possible rate of reusing data (and their definitions) for different reports and between different processes and systems. It also gives the company control over not only the external reports, but also the internal reports (Esseboom, 2012). Moreover, this strategy would potentially lead to the highest possible cost-efficiency for implementing XBRL. Only XBRL-GL is not already usable in practice as a Proof of Concept is still running and the exchange of transactions between different types of systems is still tested.

3.5 Conclusion XBRL – Answer RQ 2

The most important aspect of XBRL is that it is used to standardize financial information using the Dutch Taxonomy (NT). The contents of XBRL instance documents are based upon the taxonomies provided by the Dutch Government in the NT and by governmental agencies (extensions BDA, KVKA and CBS) and private organizations (BT). Some extensions reuse (some) elements of the NT (like the KVKA), while others reuse virtually no elements defined in the NT, despite the fact that some elements are comparable. This is important to keep into account because it can increase the difficulty of re-using data between different departments/reports.

XBRL (and XML) offers some (automatic) techniques for technical validation of an instance document. In addition, the channel Digipoort, via which the (financial) reports have to be send to the granting organizations, offers technical validation of which the result is fed back to the submitting organization/person. Besides this technical validation, validation of the content is also important. International and Dutch FRIS rules, within the NT and within the extensions, offer additional and more restrictive rules that should also be validated (or infringement should be made impossible). Validation of the internal consistency of the content can (partly) be performed using (calculation and) formula linkbase, which can also be used to validate the existence of an element or its value. Therefore, Formula linkbase offers validation possibilities for FRIS rules and certain business rules.

Lastly, there are roughly three different strategies for implementing XBRL, namely bolt-on, built-in and embedded. These implementation strategies differ in the thoroughness by which XBRL is implemented and used in the organization and business processes. The sooner XBRL is implemented in the reporting chain, the larger investments are needed by the accounting firm (and even the company with the reporting obligation), but the higher the potential benefits of XBRL.

In addition, at the time this research project is carried out, a new development with XBRL was apparent in the Netherlands. The Netherlands Institute of Chartered Accountants (‘Nederlandse Beroepsorganisatie van Accountants’) is currently developing a taxonomy for providing assurance on XBRL instance documents. Firstly, this taxonomy will consist out of all relevant texts used in the different types of audit certificates for the different types of (non-) assurance engagements (audit opinion, review statement and practitioner’s reports for compilation). Secondly, this taxonomy will be built upon a technical architecture that will ensure that the audit certificate (assurance) is indissolubly joined with the relevant instance document. This means that the audit certificate can also be digitally provided in the future, meaning that this development have to be taken into account when implementing XBRL. Besides, a project has been initiated by the Statistics Netherlands to design and implement a standardized reference chart of accounts. If the project appears to be successful it will mean that an accountant only has to map the client’s chart of accounts unto the uniformly used reference chart of accounts, by which it is also immediately tagged with XBRL-codes. This means that a built-in situation is achieved, for which the accounting firm does not have to deal with the (technical) XBRL implementation and can only focus on the accounting expertise.

4 Business Process Management

This chapter will start with a short introduction on the topic of business process management and will define the concepts used in this thesis. This is followed by a short explanation of the necessity of making the correct choice for a business process methodology (depending on the domain and context) and consequently the need of concrete support from literature for the creation of improved business processes. It will also shortly elaborate on the preconditions needed for successfully applying BPM, based on a literature review. This chapter will then conclude with a short elaboration of different BPM principles and a selection of those used in this research. The application of these approaches to the CSFT-process for utilizing digitalization and standardization can then be tested in the following chapters.

4.1 Introduction to Business Process Management

Broadly speaking, Business Process Management (BPM) is part of a decades old tradition for improving the way business people think about and manage their businesses (Harmon, 2010). Its roots lie in the process orientation trend of the 1990s and an important publication introducing the subject was the seminal book "Reengineering the Corporation" by Michael Hammer and James Champy, describing the radical redesign of business processes in companies (Feldbacher et al., 2011). The more specific central objective of BPM is enhancing business performance by improving organizational business processes (Trkman, 2010).

For the purpose of this thesis, the definition of Feldbacher et al. (2011) will be used, which is: "BPM is a method to manage and organize business processes and to improve the understanding of the given inter- and intra-relationships. BPM includes methods, techniques, and tools to support the design, enactment, management, and analysis of operational processes". This definition does not restrict its application to achieve a certain kind of results (which are not clear at the start of the project) but do focus on operational processes. The latter is important because the focus of this thesis is an operational process (compiling and sending financial statements and tax returns) and not any other (strategic) element of an accounting firm. This definition also does not restrict the application of BPM to either continuous or radical improvement, which are both within the scope of this research.

Having defined BPM it is also important to accurately define the subject matter of BPM, namely business processes (or operational processes). As it is for BPM, also the concept business process is defined in multiple different ways and a precise and commonly agreed definition which can ground it as a unique research area does not exist (Vergidis et al., 2008). In this thesis, by a business process the following is meant (Trkman, 2010): a business process is defined as a complete, dynamically coordinated set of activities or logically related tasks that must be performed to deliver value to customers or to fulfill other strategic goals.

4.2 Important Notes when Applying BPM

When carrying out a literature review, some important notes were identified in the existing knowledge base of BPM. The following three paragraphs will separately elaborate on a specific issue encountered in literature.

4.2.1 Necessity of Choosing the Correct BPM Methodology

By implementing BPM, different kind of successes have been achieved, for instance Trkman (2010) states that a positive correlation has been found between BPM and business success. For instance in

the manufacturing industry, organizations have become more agile, leaner, cost-effective, customer-focused and competitive (Miller et al., 2006). But research and reviews of literature have also showed that many BPM initiatives have failed, even up to a total of 60%-80% failed initiatives (Trkman, 2010). According to Sousa and Voss (2008) much initiatives fail due to the fact that BPM methods should not be viewed as universally applicable to all organizations and in all situations, but that difficulties arise due to a too great mismatch between the proposed form of BPM method and the particular organization context. Therefore, lately, research has shifted from the justification of the value of BPM and similar practices to the understanding of the contextual conditions, under which they are effective (Sousa and Voss, 2008). Like for instance the research by (Mohammad et al., 2010), which state that there are more than 900 improvement initiatives to improve organization's performance, but that many organizations implement them as a panacea for all organizational problems. They therefore state that some initiatives are more effective under certain conditions, contexts and situations. The success of improvement initiatives can for instance differ depending on the type and size of an organization, and the capabilities of a workforce.

We will therefore immediately carry out a short evaluation of the BPM principles for their applicability to the accounting domain and the CSFT process. Moreover, in this thesis we will add to this literature, investigating the applicability of BPM principles for optimizing service delivery processes in the accounting domain (for the utilization of standardization formats).

4.2.2 The Need for Concrete Support for Process Improvement

Besides the fact that literature is failing to describe which BPM methods work best under which conditions, the scientific community writing about BPM also seem to under-treat another aspect. While BPM methods contain different aspects (like project management), this thesis is largely focused at improving a business process. In literature it is widely agreed on that the most value-adding phase of a BPM project is that act of improving, but it is also widely agreed on that this act is lacking guidelines and is poorly supported, like stated in the seven articles mentioned by Zellner (2011). Or even sometimes business process improvement seems to be rather art than science and can be regarded as a black box, because little has investigated how it can be supported or executed methodologically (Zellner, 2011). We will therefore evaluate BPM principles on basis of their level of support for identifying improvements.

4.2.3 Preconditions for applying BPM to Service-Based Organizations – Answer RQ 3

For this research, a discrete event simulation model is chosen as research method to make quantitative estimates of the influence of the suggested process improvements on the performance of the business process (thus a quantitative validation). But, BPM literature warns about implementing BPM methodologies in service-based organizations and the (large) challenges associated with using research methods based upon hard quantitative data (such as the simulation model). This paragraph will therefore elaborate on these challenges.

Hsieh et al. (2012) and Johannsen et al. (2011) have summarized many different findings of multiple authors about the challenges encountered when implementing Six Sigma as a BPM methodology in service settings. Although the challenges specified are (in most cases) specifically aimed at implementing Six Sigma, they can be encountered when applying any quantitatively aimed BPM method, thus each of these challenges can also be encountered in this research. The findings are retrieved from Hsieh et al. (2012) and are categorized to form the table below:

Table 4: Challenges when Implementing BPM in Service-Based Organizations

Challenges:	Originally Mentioned by:
1. Data & Measurability Challenges	
a. Difficulty in data collection	Nakhai & Neves in 2009
b. Inadequate attention of measuring process performance	Antony in 2004 and Hensley & Dobie in 2005
c. Measuring the process to satisfy customer's needs is often a more general problem of data collection, quality and integrity	Does et al. in 2002, Hensley & Dobie in 2005, Antony in 2006 and Heck et al. in 2010
2. Definition Challenges	
a. Defining well-defined deliverables, the beginning and ending of a service process	Lanser in 2000
b. Defining the how and what of service-failures can be arduous	Biolos in 2002, Does et al. in 2002 and Smith in 2003
c. Hard to establish a systematic process to identify sources of errors and solutions. The use of flowcharts and process maps remains very rare in many service processes	Antony et al. in 2007
3. Challenges due to human behavioural characteristic engendering variability	
a. Large variability in clients/customers (characteristics) introduce human variability	Does et al. in 2002
b. Processes are dependent upon people and thus more subject to noise or uncontrollable factors, this variability is often subtle and difficult to quantify	Does et al. in 2002
c. Employee characteristics (friendliness, eagerness to help, honesty, etc.) are difficult to manage per se and engender variability	Antony in 2004
4. Project Selection (choice for the process improvements to be implemented) is difficult	
a. Project selection considered to be a universal challenge for Six Sigma in services	Antony et al. in 2007 and Heckl et al. in 2010
b. Project selection is one of the most critical success factors, but it still appears to be largely based on pure subjective judgment	Antony in 2006 and Raisinghani in 2005

Challenge 4(b) is supposed to be overcome, because this research is aimed at quantifying the benefits of different process improvements with the simulation model. However, it is then necessary that challenges 1, 2 and 3 will also be overcome (to a sufficient extent). Because for being able to create a simulation model some preconditions apply, namely that data is sufficiently available (or can be retrieved from experts) and that the business process is not subject to large unquantifiable variations. Moreover, it should be possible to define (causal relationships within) the business process (and its results) in sufficient detail.

4.3 BPM Principles for Improving the CSFT Process

As the criteria for selecting BPM principles are explained and identified in the previous paragraphs, this paragraph will evaluate the fulfillment of multiple BPM principles towards these criteria. The principles that will be evaluated are the most popular initiatives chosen for improving processes and organizations. This is based on Kedar et al. (2008) and is shown in Table 5 on the consequent page.

Added to this table is the Theory of Constraints (TOC), which has been originated by Goldratt and Cox (1984) and is a body of knowledge that (traditionally) made it possible for industrial and distribution companies to achieve dramatic gains in productivity and sales (Ricketts, 2011). The table continues on the page thereafter and contains the evaluation on the criteria. It also shows in the total row the BPM principles selected for this research, which are Business Process Re-engineering (BPR), Lean and TOC. For BPR, Lean and TOC specific authors have been chosen as the concrete support, as they have contributed to the concerning principles by clearly stating the different principles (/applications/heuristics) to be used in identifying process improvements.

Besides, Mansar and Reijers (2005) are selected, because they provide 29 best practices as concrete support for BPR for identifying process improvements. They also developed a framework which helps practitioners by identifying the topics that should be considered whenever applying business process improvement projects, as shown in Figure 11 below. The framework has been synthesized using a couple of widely accepted (/used) frameworks and modeling views, namely the Work-Centered Analysis Framework (Alter, 1999), the CIMOSA standard enterprise modeling views (Berio and Vernadat, 2001) and the MOBILE model for workflows (Jablonski and Bussler, 1996) and also uses the process description classes by Seidmann and Sundararajan (1997). The aforementioned 29 best practices are categorized along these different components as shown in the framework.

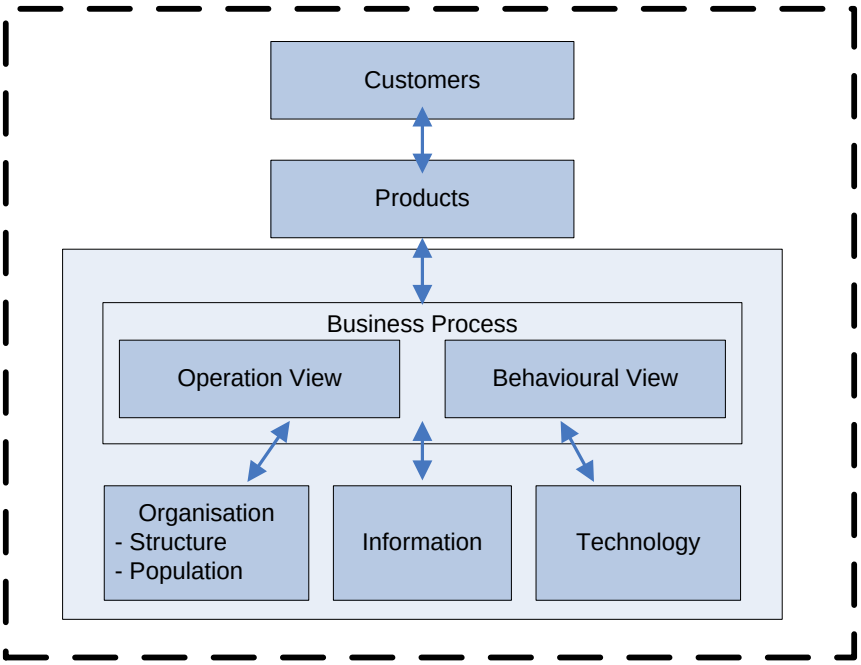

Figure 11: Framework for BPR Implementation (Mansar and Reijers, 2005)

Table 5: Characteristics and Evaluation of TQM, TPM, Six Sigma, BPR, Lean, ISO (Kedar et al., 2008) and TOC (Goldratt and Cox, 1984, Goldratt, 1997)

BPM Principle	TQM	TPM	Six Sigma	BPR	Lean	ISO	TOC
Period	Mid 1980s	1988	Mid 1980s	Early 1990s	1990	1987	1984
Approach	Quality	Resource Utilization	Variance Reduction	Fundamental Rethinking & Redesign	Elimination of Waste	Documentation and Consistency	Utilization of Constraints
Fundamental Concept	Data-based, employee driven, orientation towards customers and suppliers	Improving machine availability and includes monitoring of machine equipment called OEE to visualize losses of utilization	No. of product defects & process defects in an enterprise should keep on approaching Six Sigma target	Quantum leaps in performance are only possible by reinventing & redesigning	Continuously improving the value created for the customers by letting them pull value through a streamlined value stream	Focusing on quality goals based on internal capabilities	Full utilization of constraints and every other resource should be made subordinate to the constraint
Participation	Normally everyone and suppliers	Everyone participate	Normally everyone	Primary management	Everyone participates	Normally everyone	---
Time Phase for Improvement	Continuous improvement	Continuous improvement	Continuous improvement	Short project	Continuous improvement	Continuous improvement	Continuous improvement
Change introduced	Slow, incremental	Slow, incremental	Could be dramatic as well as incremental	Very fast and radical	Could be dramatic as well as incremental	Could be dramatic as well as incremental	Could be dramatic as well as incremental
Risk	Medium	Medium	Medium	High	Medium	Medium	---
Implementation time	Long term, 5-10 years	Long, many new things are to be learned	Short	Short	Long, many new things are to be learned	Moderate, 3-5 years	Short
Initial condition	Existing process	Existing process	Existing process	Restructuring	Existing process	Existing process	Existing process
Scope of application	Enterprise wide	Manufacturing unit	Enterprise wide	Enterprise wide	Enterprise wide	Enterprise wide	Enterprise wide

BPM Principle	TQM	TPM	Six Sigma	BPR	Lean	ISO	TOC
Concrete Support (Evaluation criteria)	Generally focused on organizational results rather than business results (Quin, 2003). Does not suggest any method/tool for implementation.	Seven concrete steps	No clear process improvement principles, but more a broad long-term decision making business strategy (Arnheiter and Maleyeff, 2005)	Reijers and Mansar (2005) for the 29 best practices	Bonaccorsi et al. (2011) for the ten types of waste for the services industry	No, just helps to implement a quality control system that provides confidence for the consistency in management processes	TOC-principles and applications (Ricketts, 2011)
Domain Applicabillity (Evaluation criteria)	High focus on quality is appropriate	High focus on equipment/machinery seems irrelevant	Importance of low number of NCPPM for quality of final product seems appropriate	Focus on IT (for automation) seems appropriate	Bonaccorsi et al. (2011) their aim on services industry seems appropriate	Aim on management processes is irrelevant	TOC seems appropriate due to involvement of middle- and higher management with process
Chosen?	**No**	**No**	**No**	**Yes**	**Yes**	**No**	**Yes**

4.4 Conclusion of BPM – Answer RQ 3

This chapter explained in further detail why it is important to make a correct choice for a BPM methodology when improving business processes. It also made clear that when improving business processes it is important to have concrete support for the act of improving business processes itself, but that most BPM methods and literature are lacking guidelines and poorly support this act. In addition, a research question is added to this research for evaluating the preconditions of the case study (CSFT process) for using a simulation study to apply BPM. The BPR best practices of Reijers and Mansar (2005), Lean and TOC have been identified as offering concrete support for improving business processes and are likely applicable to the accountancy domain. The chosen BPM principles are presented in Table 6 on page 40 for having an overview of the used principles. Moreover, they are classified according to the framework of Mansar and Reijers (2005). For the explanation of these BPM principles see: Appendix 1, Appendix 2 and Appendix 3.

Reijers and Mansar (2005) have also evaluated the qualitative impact of all the 29 BPR best practices and in their later article they have conducted a study towards the use and impact of the 'top ten' best practices (Mansar and Reijers, 2007). However, their research lacks an adequate quantitative support and although it is regarded that the results of the best practices are dependent on the domain in which they are applied, different domain validities of the best practices and their results have not (yet) been researched (Mansar and Reijers, 2007). Only recently, the applicability of the best practices in the healthcare domain has been tested, where the authors concluded that the best practices form a highly suitable ingredient for improvement efforts in the healthcare domain (Netjes et al., 2010). This thesis is carrying out a similar research, as it will also test which BPM methodologies can successfully be applied to the CSFT process in the accountancy domain. Moreover, as explained in the introduction, this research also aims to identify if BPM can be applied successfully to the accountancy sector and to which extent the research can be substantiated with quantitative evidence (the simulation study).

Moreover, because overlap between (the results of) some principles have been identified, these are combined (for detailed explanation see Appendix 13). Firstly, Lean is taken as a specification of Task Elimination, meaning that they are combined. Secondly, Triage and Task composition are also combined as they will have the same result. Lastly, the customer teams principle is a variation of the order assignment principle and are therefore also combined. All these BPM principles can now be applied to the case study to test its correctness and justification.

Table 6: All BPM Principles selected for Improving the CSFT Process

Elements of Framework	BPM Principles
Customers	1. Control Relocation [1]
	2. Contact Reduction [1]
	3. Integration [1]
Business Process Operation **(how the workflow operation is implemented)**	4. Order types [1]
	5. Task elimination [1] & 33. Lean for identifying ten types of service industry waste [2]
	6. Order-based work [1]
	7. Triage [1]
	8. Task composition [1]
Business Process Behavior **(when the workflow is executed)**	9. Resequencing [1]
	10. Parallelism [1]
	11. Knock-out [1]
	12. Exception [1]
Organization Structure	13. Order assignment [1] & 17. Customer teams [1]
	14. Flexible assignment [1]
	16. Split responsibilities [1]
	18. Case manager [1]
	19. Numerical Involvement [1]
Organization Population	20. Extra resources [1]
	21. Specialist – generalist [1]
	22. Empower [1]
	23. TOC - Replenishment (for Services) [3]
	24. TOC - Drum-Buffer-Rope (for Services) [3]
	25. TOC – Principles [3]
Information	26. Control addition [1]
	27. Buffering [1]
Technology	28. Task automation [1]
	29. Integral technology [1] & 15. Centralization [1]
External environment	30. Trusted party [1]
	31. Outsourcing [1]
	32. Interfacing [1]

[1]=Reijers and Mansar (2005), Appendix 1; [2] = Bonaccorsi et al. (2011), Appendix 2; [3] = Ricketts (2011) , Appendix 3 (15, 17 & 19 are not all shown in the correct element of the framework as they have been combined with others as explained on the previous page)

Part C. Case Study

5 Defining Boundaries, Performance Measures and Objectives

This chapter will firstly further define the (boundaries of the) business process for which improvements will be defined. This is followed by an identification of the objectives and performance measures for the CSFT process.

5.1 Defining (Boundaries of) the CSFT Process

For further defining the boundaries of the process, the process stated in the previous chapter is repeated below in Figure 12.

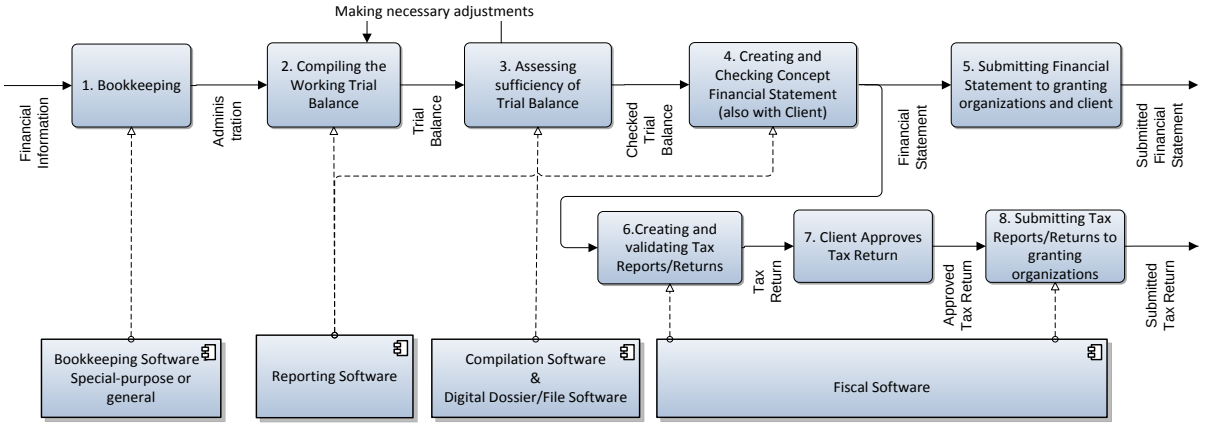

Figure 12: Global Overview of the CSFT Process (repeated)

The process consists out of 8 sub processes of which the first is bookkeeping. Bookkeeping is actually more the input for being able to start with compiling the working trial balance (and the financial statements), then being part of the process itself. For this reason, the actual bookkeeping itself falls outside the boundaries of the process. Only its possible variations, thus the different possible inputs for the remainder of the process, are taken into account. This could for instance be a bookkeeping performed by the client on paper or digitally (e.g. in XBRL), or being performed by the accountant in different possible types of software.

Sub processes 2 until 8 of the process will fall inside the scope and are thus all subject to possible improvements. For further defining the boundaries, the framework being displayed in the previous chapter from Mansar and Reijers (2005) will guide the topics that will be studied for modeling the as-is process and identifying improvements. These topics are the customers, products, business process (both from a operational and a behavioral view), organization (both the structure and population of it), technology and information, other possible topics than these six will not be researched and/or analyzed.

Furthermore defining what will be regarded as the as-is process is also important. Because the case study company is busy with implementing changes and integration two previously separate processes, namely the compilation of financial statements and the compilation of tax returns, the current state of the as-is process is hard to grasp. Moreover, the case study company consists out of 19 separate offices that all have their own slightly different process set-up. The biggest differences exist because each office is in a different phase of implementing the proposed changes. Therefore, the choice is made to regard the old process set-up where there were two separate processes, as it

was applicable at least until the beginning of 2012, as the as-is situation. This choice does also make it possible to test the already proposed changes in the HSA-project of the case study company. This old process set-up is also (most) consistent with the governing process set-up in the whole (Dutch) sector of accountancy firms, as the integration of these two separate processes is (still quite) unique. It is therefore also easier to generalize the case study to the whole accountancy domain. Furthermore the process set-up of office Rotterdam has been chosen as the As-Is situation, as it represents the process set-up as intended by 'Bureau Vaktechniek'. They for instance use the BEAT-S application (the compilation software) as supposed to and not only afterwards, as can be identified in practice.

Besides, there are different kinds of products that flow through the defined process. The accountant only compiles the Financial Statement, but this has two variants. Namely, the Financial Statements based on either commercial or fiscal grounds and both are taken into account. However, the tax specialist does have multiple different kinds of tax returns that he has to make. An overview of the types and percentages of different tax returns are shown in the table below:

Table 7: Overview of Types of Tax Returns (between brackets the Dutch term)

Types of Tax Returns Processed by Case Study Company	Percentage
Corporate Income Tax (Vpb)	44%
Corporate Income Tax (Vpb) – Tax Group (fiscale eenheid)	16%
Corporate Income Tax (Vpb) – Component of Tax Group (onderdeel fiscale eenheid)	23%
Income Tax (Ib)	10%
Shortened Corporate Income Tax (VWia)	1%
Not Tax-Compliance (niet belastingplichtig)	3%
Tax Declaration by Third Party (aangifte door derde)	3%
Total	100%

The table shows that the tax returns regarding corporate income tax form the major part (83%) of all tax returns. Therefore, only the tax return regarding the corporate income tax is taken into account. The list below summarizes the definitions made in this paragraph for (the boundaries of) the process:

1. Step 1, the actual bookkeeping is not taken into account, only the possible (different) outputs of this step (like paper administration, electronic administration, audit file, etc.) are taken into account. Steps 2 until 8 are fully taken into account.
2. The eight topics of the framework of Mansar and Reijers (2005) are the only areas taken into account
3. The old process set-up of the case study company, as it was at least until the 1st of January 2012, is regarded as the As-Is situation (this also corresponds more with the governing process set-up in the Dutch accountancy sector)
4. The process set-up of office Rotterdam is regarded as the As-Is situation
5. Both variants of the 'Financial Statements' (commercial/fiscal) are taken into account
6. Only the corporate income tax return is taken into account

5.2 Performance Indicators and Objectives – Answer RQ 4

Now the definition of the (boundaries of the) financial accounting process is clear, performance indicators that are applicable to this process can be defined. Reijers and Mansar (2005) have already qualitatively defined the results and impact of the best practices against the often used performance indicators forming the 'Devil's Quadrangle' which are time, flexibility, quality and cost.

Nevertheless, all performance indicators should be based upon the goals of the stakeholders of the system. For deciding on the performance indicators applicable to the case study input is used from Reijers and Mansar (2005) and K. (2012). An important goal in the HSA-project is to achieve *cost efficiency*; therefore, the costs associated with the financial accounting process should be minimal. Another important aspect is also the *quality* of the 'products' created, which can be interpreted as the reliability of the information in the financial statements and tax return. This means that it is required that the Financial Statements have the level of quality prescribed by NV COS 4410 and is free of substantive errors and that the tax return is approved by the Tax & Customs Administration. This will firstly result in a higher customer satisfaction, but moreover, it means a smaller margin of errors-made and thus a smaller possibility of granting organizations detecting incorrect figures. Also important, and partly determining customer satisfaction, is the *lead time* for compiling and submitting the financial statements and tax returns. Clients do not want to wait too long for receiving their financial statements and the corporate income tax returns often have a deadline set by the Tax & Customs Administration.

Customer satisfaction is naturally an important goal as it dictates customer retention and attraction and thereby (indirectly) the turnover made. Moreover, the problem-owner (BVTA) finds employee satisfaction important as it dictates their willingness to change to the new process set-up and thus the time needed to implement a new process set-up and reap the benefits.

For each of the above mentioned goals relevant performance measures have been identified (in consultation with S. (2012c) and Workshop (2012)) and the desired direction and units of measuring is shown in the table beneath. The performance of the system is based upon the values of the collection of scores on these measures for all engagements processed. A discussion of some of the (harder to define) performance measures is presented beneath the table.

Table 8: Performance Measures for the CSFT Process

Performance Measure:	Unit	Objective (Desired Direction)
1. Production costs of compiling and submitting a financial statement and tax return (Efficiency)	Euro	*Down*
2. Lead time of compiling and submitting the Financial Statements and Tax Returns	Days	*Down*
a. Lead time of compiling and submitting the financial statements	Days	
b. Lead time of compiling and submitting the tax return	Days	
3. (Information) Quality of Compiled Financial Statements and Tax Return (S., 2012c, Workshop, 2012)	Scale 1-5	*Up*
a. Expertise of employee involved with the engagement (and carrying out the tasks in the process)		
b. Amount of reviews performed (and expertise of reviewer)		
c. Amount of (automated) checks performed (on the financial administration)		

4. Customer satisfaction (Workshop, 2012):	Scale 1-5	
a. Cost of Financial Statements and Tax Return (Weight 4.1)		
b. Time between completion of Financial Statements and Tax Return and end of financial year (Weight 2.7)		*Up*
c. Quality of Financial Statements and Tax Return (Weight 2.6)		
d. Lead-Time of Financial Statements and Tax Return (Weight 2.4)		
e. Possibilities for client-specific products (Weight 1.7)		
f. Amount of (Personal) Contact moments (Weight 1.4)		
5. Employee satisfaction (Motivaction, 2008)(Workshop, 2012):	Scale 1-5	
a. Challenging tasks (Opportunities for knowledge development) (Weight 4.6)		
b. Involvement / Contacts with Client (Weight 2. 9)		
c. Autonomy (Weight 2.7)		*Up*
d. Experiencing Responsibility / (overseeing own responsibility in the whole process) (Weight 2.6)		
e. Task Identity: Involvement with each phase in the entire process (Weight 2.3)		

Some of the performance indicators have clear measures, like the production costs and the lead-time. But the other indicators were much harder to define. These indicators will therefore be 'measured', or qualitative directions of impact are stated, on a qualitative 5-point Likert-scale. Nevertheless, some more specific indicators (or proxies can be used) to argue about the impact an improvement will have, therefore indicators 3, 4 & 5 are split up in multiple indicators.

For instance regarding the information quality, no actual data is available which can be used to define and measure the quality of the financial statements or tax return (also, see paragraphs 7.2 and 0). Therefore, proxies are created which can be used to jointly define the information quality of its contents. These proxies are largely based upon Orr (1998) and S. (2012c). Orr (1998) has formulated several data quality rules which all come down to data quality as a function of its use. Data can only be of high quality when it's used and the quality is equal to the most stringent use of each element. This means that actually each received data element by an accounting firm of an organization has (for the accounting firm) a quality equal to zero. Only when an accountant and/or an automated check reviewed/checked this element, it can be concluded that a certain amount of quality (or reliability) is achieved. Taking this together with the findings from the interview it can be decided that the quality can only be safeguarded with (automated) checks/reviews together with the expertise or position of the person carrying out those checks/reviews and also the expertise of the employee who is compiling the financial statements and tax return.

Customer satisfaction has also been based on the interview with S. (2012c) but expanded (and weighed) with information from the Workshop (2012). It appeared from the interview that also the quality of the products is an important factor, but only to a small degree as it is hard for a client to assess the quality himself due to the lacking of accountancy expertise (also explained in paragraph 2.3). Naturally, clients want to pay the least amount of money possible for hiring an accounting firm, meaning that especially the before mentioned production costs determine customer satisfaction. Marginally important is the lead-time for creating the financial statements and tax return, but more important appears to be the time between the end of the financial year and the finalized financial statements and tax return. This is because when engagements of clients are started late in the next financial year, the lead time can still be very short but the delivery date of the financial statements and tax return can be unacceptable. While the possibility for client-specific products appeared to be quite important in different discussions and/or interviews, the survey from the Workshop (2012) lead to the conclusion that the possibillity for client-specific products and services (within the case study)

were marginally important. Also the amount (and nature) of contacts with the clients (within the case study) dit not seem to be important.

The proxies for employee satisfaction were firstly retrieved by using the Job Characteristics Model of Fried and Ferris (1987) and consequently it was checked if they were found to be important in a previously performed job satisfaction research (Motivaction, 2008). Moreover the Workshop (2012) was used to validate if these characteristics / indicators were still thought to be important, which lead to the indicators (in preferred order) as shown in Table 8.

Besides these indicators to measure the performance of the financial accounting process there are some constraints. These constraints are more qualitative and point out to maximally (or minimally) allowed values for certain indicators. An improvement may never cross (or overstep) these constraints and the constraints therefore have an influence on interpreting the outcomes of the improvements on the performance indicators. The constraints are as follows (K., 2012, Workshop, 2012):

Table 9: Constraints for the CSFT Process

Constraints:
The new process design should still be able to serve all possible customers (characteristics) / Flexibility
The new process design and its implementation should not result in high costs / Costs
The new process design should be able to implement in a reasonable time period / Implementation Time
The new process design should not result in a too low maintainability / Maintainability
The new process design should maintain an audit trail / Existence of Audit Trail
The new process design should conform to the applicable accounting guidelines and regulations (NV COS 4410)

During interviews with business experts and following the Workshop (2012) the *Flexibility* of the new business process appears to be the most important constraint. Due to the nature of offering services (the dependency on the customer while offering the service and above all the plurality of customer characteristics) and the high degree of data customization (as also stated by Fahy et al. (2009)), it is important that the system offers the flexibility needed to be able to compile financial statements and tax returns for (almost) all different customers (types).

Besides, it is not desired that some changes to the business process result in high costs and/or a very long implementation time. In addition, when the new business process is implemented it should not lead to (extremely) hard maintainability such that a lot of time and effort (and thus costs) are needed to maintain the process and the used information systems.

6 Modeling the As-Is Situation

In this chapter firstly the as-is process will be modeled, but before this will be performed, a short discussion will be presented about the choice for a modeling language. The consequent paragraphs will go more into detail about the modeling of the As-Is situation and is followed by an explanation of the data collection and analysis.

6.1 Choosing the Appropriate Modeling Language

Bandara et al. (2007) have researched which major issues exist in applying BPM. One of the major issues is associated with the process visualization by means of process modeling and especially finding the right modeling language for the intended purpose. To analyze and improve the process by means of the topics identified by Mansar and Reijers (2005), it is important to choose the appropriate modeling language which is able to model all the eight topics mentioned in this framework.

A modeling language offering most of these topics and simultaneously allowing a rich definition of the business process itself is the task based modeling language Business Process Modeling Notation (BPMN) (Van Nuffel and De Backer, 2012). A major advantage of BPMN is its understandability especially among business users, which makes it easier to communicate with the problem owner (Demirörs and Çelik, 2011). BPMN allows, besides the modeling of the business process itself, to fully model the necessary information about the population, the structure, the products (and their intermediate forms) and the contacts with internal and/or external customers. Only modeling the information and technology used in the process is limited to a very abstract form. Another modeling language that is gaining momentum as an efficiently and semantically rich architecture modeling language is Archimate (Van Nuffel and De Backer, 2012). It consists out of three different layers, namely the Business Architecture, the Application Architecture and the Technical Architecture. The problem is that Archimate does not provide a rich definition of business processes, for instance for making choices, but it does allow a richer modeling of information and applications. Therefore, these two separate modeling languages are jointly used in this research, meaning that only a very small portion (applications) of Archimate will be added to the BPMN models. Now having chosen the modeling languages, the next paragraph will present the actual modeling performed.

6.2 Process Models of the As-Is Situation – Answer RQ 5

Before the process was modeled, an understanding of the electronic environment of the business processes was needed. Therefore a model was created solely describing the applications used in the process together with the (intermediate) information flows, based on S. (2012a). This model is shown in Appendix 4. Before the process models have been created, also an overview of the information contents of the financial statements and the tax return had to be created to comprehend the product created in the business process. To have a clear overview of these products, information models are created and shown in Appendix 5, which are based upon the Dutch Taxonomy (NT). Consequently to be able to model the As-Is situation, data was needed about the business process. Therefore, several business experts were interviewed, namely:

1. Manager RA, Bureau Vaktechniek (Functional Applications Manager BEAT-S) (C., 2012)
2. Manager AA, Bureau Vaktechniek (Responsible for IT (development)) (S., 2012a)
3. Junior Manager AA, Office Nijmegen (L., 2012)

4. Case Manager, Office Rotterdam (S., 2012d)
5. Advanced Assistant Accountant, Office Utrecht (S., 2012b)
6. Assistant Tax Specialist, Office Utrecht (V., 2012)

Besides these interviews, the hour-registration of five clients has been studied in detail. This led to the process models that can be found in Appendix 6, which have been validated in a second interview with S. (2012c), and in the interviews with (S., 2012b) and (G., 2012). During the interviews, it immediately appeared that, it was reasonably hard to depict the process of compiling the financial statements as carried out by the employees. It was often said that the arrangement of work is heavily dependent upon the client, the office and the responsible accountant and even strongly dependent upon the case manager assigned to the engagement and in some cases dependent upon the assistant accountant working on the engagement. The business process is therefore modeled as it is supposed to be carried out in its most extensive and ideal form. This entails that if time pressure or other obstacles are apparent some tasks are likely to be skipped (or rearranged). In addition, some tasks are simply not carried out for easy clients (not to its full extent). Another challenge was with modeling the type of employee who is carrying out a task, which could heavily vary. The modeling depicts the employee who is most likely to carry out that activity / part of the process. How these challenges affected research question 6 is further discussed in paragraph 7.2.

Following this reasoning, all process models are created. Moreover, a separate model has been created containing the different (types) of applications used in the business process. This model also contains the information flows between these applications and the information contents of those flows together with the information contents that are added by the accountant (or tax specialist) during the use of one of the applications. This model is presented in Appendix 4. The process models together with the information model give a clear understanding of the business process in scope. These models serve as the basis for creating the simulation model in chapter 0 and for identifying process improvements in chapter 8.

6.3 Aspects of the CSFT Process not shown in BPMN-models

The BPMN models do not allow a full explanation of the business process. The BPMN models do show the sequence of activities in the process, together with the actors that carry out these activities, the choices that are made, the information documents/concepts used and created, the applications & databases used and the contacts with the client. However, the BPMN models do not allow representing some conditional choices needed to fully describe the business process.

The client requests (for Financial Statements and Tax Return) that enter the system in sub process 1 have different characteristics due to the nature of the client. A distinction can be made between small and medium sized entities, which often have a different processing in the business process. Above all, these characteristics affect the time needed to carry out certain activities. This influence is described in the next paragraph, so will not be further discussed here. In addition, the accountancy firm itself actually primarily arranges the arrival of client requests. This is because recurrent requests (clients who were already client the year before) form the major part of the requests and are activated when the responsible accountant (and case manager) decide that they have enough time to process that request in a reasonable time period (preferably 2 months, but mostly approximately 3 months (S., 2012c)).

In this same process, the team assignment takes place (task 1.1). Regarding team assignment, some rules can be extracted from the real life process. A responsible accountant mostly has his own portfolio of clients, thus a client request per definition belongs to a responsible accountant. Then a case manager is selected which has (the most) available time to process the request. Consequently a

case manager, for the greater part (90% (S., 2012c)), has a fixed team of approximately 4 assistant accountants which can be chosen to process the request. For small clients 1 or 2 assistant accountants are chosen, for large medium-sized clients 3 or 4 assistant accountants are chosen. Next, an available (responsible) tax specialist is assigned to the client on basis of availability.

6.4 Data Collection and Analysis

The behavior of the systems is also represented by data representing primarily the time needed to carry out certain activities (processing times). Other information is also needed representing the characteristics of the client, company and the financial statements. This information could mainly be retrieved from the monitoring database of BEAT-S that stores all relevant information of each dossier (representing a company of a client), see Appendix 7 for these results. Consequently, the hour-registration of the case study company was (supposed to form) the major input for the mathematical data needed to represent the time needed to carry out certain activities. Appendix 8 explains how this data was retrieved from the hour registration. Unfortunately, the hour-registration seemed to be a much lesser valuable source for collecting data than was assumed in advance (*also see Reflection chapter*). This was due to multiple specific obstacles (see also Appendix 8). A further discussion about the encountered obstacles is separately discussed in paragraphs 7.2 in the next chapter, as it concerns research question 6. Nevertheless, here the results from the data analysis are further discussed.

The data from the hour-registration and monitoring database were combined to form one large dataset. This dataset was consequently analyzed to better understand the behavior of the business process and to be able to calculate some input variables determining processing times in the business process. This analysis is explained further in Appendix 9.

From the analysis it can be concluded that the difficulty (/size, interpreted as length of processing times) of a client (for compiling the financial statement, code 21) is largely dependent upon the amount of components (/dossiers) that are within a client group. A client group is one client for which the compilation is performed, but this client can have multiple different organizations / holdings for which a separate dossier is created, and a separate financial statement (and in half of the cases also a separate tax return) is compiled. Besides, the difficulty for compiling a financial statement is also dependent upon the amount of general ledger accounts (GLAs) that the client has on basis of his administration. Firstly, calculating Pearson Correlation between all relevant variables lead to this conclusion and consequently by the calculation of a regression model from which it appeared that these two variables explained the most variance. It resulted into a significant ($F=85,86$; $Sig.<0,001$) model with 50% explained variance for the total hours spent on compiling the financial statements, with the following regression formula ($Sig.<0,01$) :

*Total Hours Spent 21 = - 51,94 + 28,07 * Amount of Dossiers + 4,92 * Avg. Number of GLA*

If we would imagine a small client (group) consisting out of 1 component with 8 GLAs it would lead to a total hours spent of approximately (-51,94 + 28,07*1 + 4,92*8 =) 15,49 hours. When compared to the original data with 3 separate client groups containing 1 component and 8 GLAs it seems that this calculated value is indeed comparable (12,55 / 17,2 / 22,18). This finding can be used for creating the simulation model. For compiling the tax return (code 32) the total amount of hours spent on the tax return shows a relationship with the amount of tax returns (which does not have a one-to-one relationship with the amount of components). When this variable was calculated and used in a correlation analysis, it appeared that this variable showed the strongest relationship with the total hours spent on the compilation. Still, it is a weak relationship and a significant regression model

could not be calculated. But because the relationship is significant and theoretically likely, this finding will be used in creating the simulation model.

7 Simulation of the As-Is Process

This chapter presents the process of the creation, verification and validation of the simulation model. Because the business process of the case study is a discrete process, a discrete event simulation model is used. Moreover, the computer software used for specifying the process models is Arena. This choice is primarily based upon pragmatic reasons, firstly because Arena is based upon the flow-oriented simulation language SIMAN, which is easier to understand than an object-oriented simulation language (especially for non-simulation experts). Secondly, because the simulation model is to be used for understanding the system and largely to be used in a demonstration with the problem-owner and business participants it is important that it is easily understandable. Thirdly, the chosen modeling language is BPMN, which is easy translatable to a flow-oriented simulation language. Fourth, for understandability for the business experts, it is important to be able to include an animation with the simulation model and Arena offers excellent tools for clear and easy animation of the simulation model.

The first paragraph will shortly explain the importance of validation and verification of a simulation model. The following paragraphs will present a discussion of the main findings regarding the included research question for the applicability of a quantitatively aimed research (simulation study) to the case study. The paragraphs thereafter will elaborate on the specification & verification and on the validation of the simulation model.

7.1 Verification and Validation of a Simulation Model

After the specification of the simulation model in SIMAN in Arena, it should be checked if the simulation model represents reality in the desired way. Two steps are important to make sure that this is the case, namely verification and validation. The process of verification is to check if the model is correctly specified and coded and is correctly translated from the conceptualization (the business process models) to the model specification (Verbraeck and Valentin, 2006). The aspects that have to be verified in the verification phase are the following (Verbraeck and Valentin, 2006):

1. Are the input variables correctly coded?
2. Is the model-logic correctly coded?
3. Are the output variables correctly calculated?

When these aspects are verified the simulation model is verified in its whole and it can be concluded that the simulation model contains the correct input variables, has the right structure and the output variables correctly represent the expectations of the output variables. Consequently, the simulation model also has to be validated. During the validation it is established whether the simulation model adequately represents reality (Verbraeck and Valentin, 2006). There are two types of validation, of which the first is replicative validation. With replicative validation, the output variables calculated by the simulation model are compared with the output variables of the business process in reality. The other type of validation is structural validation. Because the model is used to calculate the performance of changed/improved business process models it is also needed that the simulation model correctly responds to changes in its input variables. This can be done by changing input variables drastically to see if the model reacts as it would do in the real life situation or with a sensitivity analysis. With sensitivity analysis the input variables of the model are slightly altered and it is checked how the performance of the simulation model changes because of these slight alterations.

When a model is very sensitive for a change in one of its input variables caution has to be taken with using this variable. Either it is still valid and forms a good instrument to improve the business process, or it is simply a mistake in the model, thus this should be validated.

Besides a quantitative evaluation (/validation) a qualitative validation can also be performed. This is most often being done by showing the simulation model to business experts and letting them evaluate the structure and behavior of the model and the output variables created by the model. Often, to make it possible for business experts to validate the model, animation is needed to quickly comprehend the model and therefore animation forms an important part of the simulation model. Paragraph 7.4 will explain the qualitative validation of the simulation model performed for this research.

7.2 Fulfillment to Preconditions for (using a simulation model for) Applying BPM to the CSFT Process - Answer RQ 6

In paragraph 4.2.3 a table showed the challenges to expect when applying BPM with a strong quantitative focus to a service-based organization. Some of these challenges were indeed encountered while carrying out this research. All the detailed information about these challenges is discussed in Appendix 10 on page 101 and is summarized in Table 10 on the next pages.

Table 10 firstly repeats the challenges that were identified in paragraph 4.2.3 with a literature review. Next, it states if this challenge was also encountered (enc. ? in the table) in this research and during which phase of the research it was encountered. Some were encountered during definition, meaning that not even in reality all relations/variables could be identified due to the complexity of the CSFT process. Others were encountered during conceptualization, meaning that when creating abstractions/generalizations I did not succeed in quantifying the relationships between independent and dependent variables. Lastly, some challenges were encountered during specification, meaning that the required data could not be acquired for specifying the conceptualization. The table also shows the consequence of the encountered challenges for this research.

Table 10: Challenges Encountered in Case Study Research for the CSFT Process

Challenge:	Enc. ?	Phase:	Example:	Consequence:
1. Data & Measurability Challenges				
a. Difficulty in data Collection	Partly	Specification	1. Data was available, but hard to retrieve from the electronic sources (due to low practicality) and hard to combine (due to a different level of measurement)	**A.** Increased time effort and loss of detail
b. Inadequate attention of measuring process performance	Yes	Definition	2. No objective judgments of efficiency are made within the company	**B.** Efficiency can be calculated, but not objectively judged (and thus not valued)
		Specification	3. No data is stored about the quality of the products created	**C.** No causal relations with quality and other aspects could be specified
c. Problem of data quality and integrity	Yes	Specification	4. Data from the hour-registration was often incomplete (sometimes missing information), invalid (often wrong/general codes), inconsistent (employees registered their hours in different ways) and not completely accurate (registered other than real life situation)	**D.** No identification of lead-times for separate tasks in sub processes 2 & 3 **E.** No calculation of lead-time possible from hour-registration
2. Definition Challenges				
a. Defining well-defined deliverables & the beginning and ending of a service process	No	Deliverables are Financial Statements and Tax Return. Moreover, beginning and end of service process could be identified.		
b. Defining the how and what of service-failures can be arduous	Yes	Definition	5. It is almost always necessary to make corrections in the review phase of the process, it is (implicitly) regarded as normal and accepted that mistakes are made during compilation. Indeed, no use of flowcharts and process maps of the CSFT process.	**C.** No causal relations with quality and other aspects could be defined
c. Hard to establish a systematic process to identify sources of errors and solutions				
3. Challenges due to human behavioural characteristic engendering variability				
a. Large variability in clients/customers (characteristics) introduce human variability	Yes	Conceptua-lization	6. Client difficulty is extremely variable and *strongly* affecting needed process times (for instance ranging from 15 to 150 hours in total) and the arrangement of the process (set up and employees). Not all independent variables (and relationships) could be identified and quantified	**F.** High variability in process times which could not be causally related to (explained completely with) all independent client-

					variables **G.** High variability in process set-up which could not be quantified (and related to independent client variables)
	b. Processes are dependent upon people and thus more subject to noise or uncontrollable factors, this variability is often subtle and difficult to quantify	Yes	Conceptua-lization	7. Offices, Responsible Accountants, Case Managers and even Assistants all have personal preferences *strongly* affecting the arrangement of the process (set up, employees and applications used)	**H.** High variability in process set-up which could not be quantified (and related to independent preference variables)
	c. Employee characteristics (friendliness, eagerness to help, honesty, etc.) are difficult to manage per se and engender variability	Yes	Conceptua-lization	8. Sometimes time-pressure or employee characteristics/preferences make employees decide to postpone or advance specific clients or to eliminate/postpone certain reviews	**I.** The postponement or advancement of clients due to employee characteristics /preferences could not be quantified

7.3 Influence of Encountered Challenges on Model Specification and Verification

Some challenges encountered have an influence on the model specification & verification, while others have an influence on the model validation. Those influencing the model validation are discussed in the next paragraph (consequences B and E), while the ones influencing the model specification and verification are presented in this paragraph. Besides, consequence A did not directly have a negative consequence for the specification, verification nor validation.

Firstly the specification of the model logic has been performed by translating the business process models as specified in BPMN to the SIMAN specification of Arena (using the translation rules shown in Appendix 10). Due to the challenges encountered with data quality, measurability and variation as described in Table 10, some exceptions had to be made. The exceptions to these translation rules and the simplifications made during specification are presented in Table beneath. Besides the in Table 11 described simplifications (of certain parts) of the simulation model caused by the un-fulfillment to certain preconditions, some other simplifications have been implemented due to the simulation language (in Arena) lacking some functionality for correctly specifying the reality of the business process of an accounting firm. The problems encountered were:

- ***Problem 1:*** The business process aims for quickly finishing one engagement. Normally, the SIMAN specification in (and logic of) Arena makes resources process those entities which have 'requested' the resource first, not depending upon their arrival time in the system. However, in reality, the employee would give priority to the entity which entered the process earlier.
  Simplification: A quick solution to overcome this problem was to give each entity a priority based on the sequence of arrival in the model, meaning that an entity that has entered the model earlier will be processed first.
  Remaining Problem: This solution only works when the resource is currently processing an entity, but if for instance an entity in the beginning of the model requests a resource in its available time and another entity in the end of the model does this only 1 minute later, still the entity in the beginning of the model is processed earlier. In reality, the employee would know this and would thus 'do nothing' for one minute and would than start working on the entity in the end of the model.
- ***Problem 2:*** Problem 1 is related to another problem regarding the planning of activities and clients. In reality work is planned, thus the planning determines when which employee works on which client (and which tasks he performs). The simulation model (in Arena) is based upon the principle that entities are processed purely based upon their arrival at a process/activity.
  Remaining Problem: Planning activities could not be incorporated in the simulation model, thus this problem could not be overcome, forming a limitation of the simulation model.
- ***Problem 3:*** The 'arrival' of clients in the case study is not an uncontrollable input variable as is mostly the case with simulation models (in Arena). In reality, the employees can look ahead, estimate their work pressure for the first coming period (for instance the coming few weeks) and decide to start working on a client or not. In the simulation model, it was (nearly) impossible to include this anticipation on future work pressure.
  Simplification: To partially overcome this problem and to make it possible to let employees decide to actuate a client, it was possible to include a reactive decision. By using some self-developed formulas, it was possible to calculate momentarily work pressure. By evaluating this momentarily work pressure it was possible to let resources make reactive decisions for actuating a client when a sudden drop in work pressure was experienced.
  Remaining Problem: This only makes the simulation model behave more reactive than proactive, as it would behave in reality.

Table 11: Simplifications of Simulation Model

Consequence:	Simplification:	Remaining Problem:
C. No causal relations with quality and other aspects could be specified	Because almost always corrections are made, it is chosen in the simulation model to always perform corrections. Only the length of the reviews and the process time for corrections is dependent upon client difficulty being explained with the number of components and GLAs as explained in paragraph 6.4.	No causal relations between causes and consequences of errors are included in the model, limiting the possibilities for testing process improvements (for their impact on quality) with the simulation model.
D. No identification of lead-times for separate tasks in sub processes 2 & 3	These sub processes are therefore modeled as a single activity in the simulation model for each component of a client group. Only the consolidation (when applicable) of the separate components is modeled as a separate activity.	It is limiting the possibilities for testing process improvements with the simulation model which are applicable to specific activities within sub process 2 and 3
F. High variability in process times which could not be causally related to (explained completely with) all independent client-variables	As explained in paragraph 6.4 the variables concerning the number of components and GLAs have been identified as explaining approximately the half of the variance in the processing times. Therefore these two variables are incorporated in the simulation model.	Still half of the variance is unexplained and thus only reflects half of reality with the specified relationships. It limits the possibilities for using the simulation model to calculate the efficiency.
G. High variability in process set-up which could not be quantified (and related to independent *client* variables)	To take into account as much of this variability in the simulation model, some decisions/results are based upon chance. This chance is multiplied with the size/difficulty of the client if it has been identified that this is one of the main causes for the variability.	No inclusion of all causal relationships for variability in the process for its business process behavior and organization structure (terms related to Reijers and Mansar (2005)) dependent on client characteristics
H. High variability in process set-up which could not be quantified (and related to independent preference variables)	Variability engendered by personal preference is in most cases within sub processes 2 and 3. These activities are already modeled as one large activity, thus this noise is included in the (variation of the) processing times for this activity. Variability based upon personal preference of different employees involved (responsible accountant, case manager and employee) still existing is removed from the model by specifying the most likely and extensive arrangement of work	No inclusion of all causal relationships for variability in the process for its business process behavior and organization structure (terms related to Reijers and Mansar (2005)) dependent on employee characteristics (/preferences)
I. The postponement or advancement of clients due to employee characteristics /preferences could not be quantified	Client priority is not included within the model. All clients are treated as equally. Some decisions based on time pressure are included by calculating the near proximity of the predefined deadline.	The difference with the current situation cannot be clearly stated, as the current situation (regarding process set-up) is differing and not completely equal to the simulation model. Besides, in reality, deadlines are sometimes postponed by mutual agreement with the client, this is not included in the simulation model

7.4 Model Validation

To validate the model, the model outputs are compared to the performance of the business process in reality as is retrieved by performing a data analysis on the dataset. Appendix 12 shows the outputs of the simulation model together with the outputs of the data analysis.

However, due to some of the before mentioned data quality & variability issues the comparison of the model outputs with the data analysis results is hindered. Firstly, the (minimal, average and maximum) processing times for activities in the simulation model do not entirely consist out of pure variation, but are also dependent upon the difficulty of the client. This difficulty is in the simulation model expressed with a variable representing the number of components and a variable for the amount of GLAs, but this is still not explaining all variability (Consequence **F** of Table 10). Therefore, the interpretation of model outputs and their comparison with results from the data analysis is more difficult, this is explained in Table 12 below.

Table 12: Difficulties with interpreting Simulation Model Output

	Normal Interpretation of Model Output			Interpretation of Research Model		
Entity type:	**Min Hours**	**Avg. Hours**	**Max Hours**	**Min Hours**	**Avg. Hours**	**Max Hours**
1Comp	Minimal processing time for entity 1Comp	Average processing time for entity 1comp	Maximum processing time for entity 1Comp	Minimal processing time **for the simplest variant** of 1Comp	Average processing time **for the average variant** of 1Comp	Maximal processing time **for the hardest variant** of 1Comp

Taking this into account, manually comparing the model outputs with results from the data analysis seem to lead to the conclusion that these two are reasonably comparable. One observation is that the variability of the results from the data analysis per and between different component types seems to be larger in reality than in the model outputs. Because not all variation of the data set could be explained by using the amount of components and GLAs, and because these two variables are the only ones used in the simulation model, it is obvious that more variation is expected in reality than in the simulation model. Still, due to difficulties with interpretation, the implications of the data quality for the data analysis and the high variability of real process performance, it is important to validate the model outputs with business experts. Besides, because the lead-time could not be identified using the data analysis (consequence **E**) this should be validated in its entirety with business experts.

7.4.1 Validation of the Simulation Model with Business Experts

The validation of the model outputs with business experts have been performed in a workshop setting (Workshop, 2012). The setting of this workshop, including a short explanation of the participants and a short summary is depicted in Appendix 1. The participants were firstly shown the animation of the model outputs and were shortly explained about its working and set-up. Consequently, the participants were shown the model outputs and its interpretation was explained. The participants were asked to discuss these model outputs and decide about the extent to which the model outputs reflect reality. The following conclusions can be drawn:

1. The hours spent on the different sizes of client groups regarding the financial statements & tax return per (category of) employee type *(like in Appendix 12)* seem to reflect reality well, but:

    a. Regarding financial statements, the involvement of the function levels of case manager up to responsible accountant (partner) with the simplest possible client group is maybe a bit too high.
    b. Regarding tax returns there are some more extremes in reality than calculated with the model. However, the participants did mention that these are quite rare.
2. Lead-time of Financial Statements *(simple texts about minimal, average and maximum lead times),* split up in:
    a. Lead-time of Financial Statements seem to reflect reality correctly for both variants:
        i. lead-time from first activity to sending concept financial statements to client
        ii. lead-time of first activity to last activity (archiving/finalizing)
3. Lead-time of Tax Return *(simple texts about minimal, average and maximum lead times*):
    a. During the workshop we and the participants firstly had a different interpretation of lead-time. When having chosen the more obvious definition, the lead-times matched reality.
4. Waiting-times of work-in-process for the (different) reviews in sub process 5 *(table per employee type)* seem to reflect reality correctly.

The simulation model thus seems to reflect reality well enough for the participants to have confidence in the model, with a small discrepancy due to variation of the real process performance and the interpretation of lead-time. As the simulation model is supposed to be used for calculating the more hard performance indicators, which are efficiency and lead-time (as explained in paragraph 5.2), the simulation model is concluded to be largely validated for its use. However, the simulation model does not explain all variability of reality, but the business experts concluded that it is reflecting the largest part of reality regarding the engagements for clients.

7.5 Conclusions of Simulating the As-Is Process

Research question 6 that was included for assessing the possibilities of using a simulation study for applying BPM methodology led to the conclusion that most preconditions are not fully met. This firstly led to some simplifications of the simulation model. For instance, sub processes two and three that consist out of multiple different tasks (as shown in the BPMN model) had to be specified as one large activity in the simulation model. Unfortunately, this is likely to influence the possibilities of the model for testing certain process improvements. Secondly, it led to the falsification of certain parts/logic of the simulation model, like for instance the planning of activities and the reactive 'actuation' of clients. The simulation model has subsequently been validated using the opinion of business experts and manual – due to unfulfilled preconditions - comparisons, but only does not correctly reflect the large variability in reality regarding processing times. The following can be concluded:

1. The model cannot be used for testing process improvements aimed at activities within sub process 2 & 3 nor to drive down the source of errors (or to limit the consequence of errors)
2. The simulation model is reflecting production costs and lead-time of the financial statements and tax returns correctly, but lacks some extreme variability for needed processing times.
3. The model can only be used to test different process improvements for their influence on efficiency & lead-time
    a. However, due to the impossibility of defining causal relations (other than the process-flow) between a single task/employee and the overall process performance efficiency can only be calculated by task-elimination. Task elimination will (in most cases) not accurately reflect reality as the simulation model does not include any side effects.

8 Improving the business process

In the previous chapter, the simulation model has been created and (largely) verified and validated. Now, process improvements can be identified, which will be performed on basis of applying the principles of paragraph 4.4 to the business process. Consequently, the impact of the identified process improvements on efficiency and lead-time will be tested using the simulation model. The influence of the process improvements on quality, customer satisfaction and employee satisfaction is thereafter presented by using the opinion of business experts (Workshop, 2012).

8.1 Applying the BPM Principles to the CSFT Process – Answer RQ 7

In Appendix 13, all the principles of paragraph 4.4 are explained and applied to the case study. The impact of these principles according to literature is also discussed in this appendix. However, in this appendix it is solely discussed if it could be applied to the case study and not its likely implications. Applying all principles to the case study led to the identification of 37 possible process improvements, of which some are similar and/or overlapping, some are trying to improve the same tasks/sub processes, while other process improvements require the preliminary application of another process improvement and others help to implement (or are a specification of) another improvement. In addition, some possible process improvements prescribe the opposite of another. Thus, there are not 37 completely separate process improvements. See Table 13 on the subsequent pages for all the identified process improvements and some of its details. The table also shows (in the bottom) which principles did not lead to the identification of process improvements and the reason why.

The process improvements in Table 13 below are based on solely applying the BPM principles, but are not all very specific. This is because the possibilities of XBRL for applying these improvements have not been discussed yet. Nevertheless, some of the possible improvements do relate to an XBRL implementation or some can be implemented by using XBRL and others relate with software functionalities. Therefore, the different process improvements are grouped (into scenarios) and have been detailed using XBRL and software functionalities in Appendix 14.

Table 13: Possible Process Improvements based on applying the BPM Principles

	Possible Process Improvement	Originating Principle(s)	Applicable to sub process / tasks / area	Preconditional Process Improvement	Similar / Supporting Process Improvement	Contrasting / Opposite Process Improvements
I	Relocating the completeness and accuracy check of the received (non-) financial data and information towards the customer	1	sp 1 & client contact		II	
II	Relocating the completeness and reconciliation controls of the financial administration towards the customer	1	sp 1 & client contact		I	
III	The contact moment for requesting the client for his (non-) financial data and information and his response be combined with the contact moment for sending and receiving the (approved) engagement letter	2, 5 & 33	sp 1 & client contact		IV	
IV	The contact moment for sending/discussing the concept tax return to/with the client can possibly be combined with sending the final financial statements to the customer	2, 5 & 33	sp 6 & 9 & client contact		III	
IV a	Or with sending/discussing the concept financial statements *	2, 5 & 33	sp 5 & 9 & client contact	VII	III	
V	Prevent the necessity of requesting additional data and information during the compilation of the financial statements from happening	2	sp 1-3		XIX	
VI	Integrate with the internal financial accounting processes of the client's company (when existing)	3	sp 1		XXI	
VII	Integrate the process of compiling the financial statements with the process of compiling the tax return and let them run in parallel *	3 & 10	sp 2 - 8			
VIII	Divide the compilation of the trial balance into multiple smaller tasks and appropriate them to the correct resources	7 & 8	sp 2-3 & resource		XIII	
IX	Combine (some of) the different tasks in the planning & preparation phase into one composite/general task	7, 8 & 9	sp 1			
X	Isolate the clients with a negative financial situation for separate handling	12 & 21	sp 1			

XI	Let the review of the tax position by the responsible tax specialist be either performed by someone of the accountancy department or eliminate this review	19	sp 5 & review		XXVI & XXVII	
XII	Assign the most specialized resources (when available) to the corresponding tasks	14	resource allocation	VIII or XIII		
XIII	Assign resources to the activities of one (or multiple) sub process and not to the engagement, by which specialists and generalists can be created.	21	resource allocation		VIII	
XIII a)	Assign resources to engagements of one (or few) lines of industry	21	Resource allocations			
XIV	Make sure that all documents are electronically archived such that employees do not have to spent time on searching for hardcopy documents	5, 15, 29 & 33	automation			
XV	Remove the involvement of the case manager with the business process and empower the assistant accountants to have the decision authority of all tasks until sub process 5.1	5, 22 & 33	resource allocation			
XVI	Appoint someone to manage the capacity of the assistant accountants (and case managers) in such a way that the responsible (and reviewing) accountants are fully utilized in their available time, but not get overloaded with work, and that the SLAs are met	24	process management		XVII	
XVII	Determine the adequate size of the buffer for the responsible (/reviewing) accountant and manage the actuation of clients such that this buffer is always at a sufficient level.	24	process management		XVII	
XVIII	Appoint an additional employee with the same responsibility as the responsible accountant (responsible of the dossiers and clients). OR Create more time in the agenda of the responsible accountant for reviewing (and signing)	25	resource allocation			
XIX	Always perform a (more) intensive check on the received data and information in sub process 1.	26	sp 1		V	XXVII
XX	Always let the case manager, the responsible accountant, reviewing accountant and tax specialist review the concept financial statements before it is send to the customer.	26	sp 5 & review			XXVII
XXI	Request the needed information & data for the financial statements and the tax return on a more frequent basis	27	sp 1 & client contact		VI	
XXII	Make sure that all automation possibilities are being used by the employees in the business process	5, 28 & 33	automation			
XXIII	(Partially) Automate more checks of the financial administration which deal with (comparison of) financial figures	28	sp 2-3 & automation			
XXIV	Make a standardized interface for all contacts with the client (client portal) *	32	sp 1, 5 & 9			
XXV	Reduce the time of waiting for clients to respond (and approve)	5 & 33	client contact			

XXVI	Reduce the time of waiting for reviewers to review and approve	5 & 33	sp 5 & review		XI & XXVII	
XXVII	Reduce/eliminate the (amount of) reviews in sub process 1 (3 reviews), sub process 5 (at least 4 reviews) and sub process 8 (1 review)	5 & 33	sp 1, 5 & 8 & review		XI & XXVI	XIX & XX
XXVIII	Reduce/eliminate working with incomplete or non-finalized financial figures by an assistant accountant or tax specialist, such that less correction rework is needed	5 & 33	sp 1-3		XIX	
XXIX	Reduce/eliminate the mistakes made by the assistant accountant in sub processes 2-4, such that less correction rework is needed	5 & 33	sp 2-4		XXVIII	
XXX	Reduce/eliminate the mistakes made by the tax specialist in sub process 7, such that less correction rework is needed	5 & 33	sp 7		XXVIII	
XXXI	Define a standard procedure for the business process which should be followed together with standard processing times for different parts of the process	5 & 33	Standard-ization			
XXXII	Standardize all (/as much as possible) of the in the process used (data-)formats	5 & 33	Standard-ization			
XXXIII	Minimize the use of different software applications, where existing software packages can be extended to take over functionality of others * (to optimally benefit of the 'store once – report many' concept)	5 & 33	Standard-ization			
XXXIV	Incorporate (XBRL) validation/consistency checks **	5 & 33	Task automation			
XXXV	Improve the coordination between the accountancy & tax specialist departments **	19	process management			

Principles falling outside the boundaries of the business process, but are recognizable in the case study company	6 & 11
Principles already being applied on standard basis in the case study company (and sector)	13, 17 & 18
Principles not leading to process improvements for the case study	4, 16, 23 & 30
Principles outside scope of research	20 & 31

*** Already (partly) applied in the HSA-project**

**** Originated because of the HSA-project**

Bold improvement numbers are improvements that are (or can be) related to (/with) XBRL

8.2 Analyzing the (simulation model of the) As-Is Process – Answer RQ 8

A simulation model (in Arena) is most often used for searching for bottlenecks, and researching the influence of expanding the capacity of bottleneck resources. From the simulation model it is concluded that not the case manager, nor responsible/reviewing accountant nor the responsible tax specialist is forming a (significant) bottle-neck in the current situation. Maximum waiting-times of work-in-process for these resources appear to be 5 days, while it is on average only between 1 and 2 days. When comparing this average with the total lead-time (of on average 2.5 months and maximally approximately 4 months) those waiting-times do not appear to be significant.

Therefore it is chosen to perform an analysis of the As-Is situation based upon the data available from the Monitoring database and the hour-registration. These analyses are shown in Appendix 15 and Appendix 16. While some significant differences could be identified in the performance of different offices, unfortunately their possible causes could not be identified. Therefore the analysis of the As-Is situation did not lead to any new possible process improvements.

Besides comparing the performance of different offices, the data was also analyzed to detect if the claims of certain principles (translated into several process improvements) could also be detected in the data, which are shown in Appendix 17. The data analysis suggest that the claims of the task composition and numerical involvement principles are true, as a significant correlation has been found between the number of persons/tasks and the (normalized) total hours spent on an engagement. Unfortunately, data quality was not sufficient for this analysis to draw this conclusion. The expert assessment of these possible process improvements therefore has to be used to test if these suggestions are indeed true.

The empowerment principle could also partly be researched using the available data. The empowerment principle prescribed to remove middle management from the process, in this case meaning the removal of the involvement of the case manager from the process. How the analysis has been performed is also explained in Appendix 17. It appeared that the degree of involvement of the case manager has a reasonably strong negative relationship with the total hours spent on the engagement. Thus, the more a case manager was involved with an engagement, the less total hours were spent on the engagement. Nevertheless, because the case manager is more expensive, it did not lead to a decrease in the total cost of the engagement. From this analysis it can be concluded that either a case manager is more productive, or, the case manager is more experienced in managing the process and assistant accountants by which a decrease in total hours spent is caused. The data analysis suggest that removing the case manager's involvement in the business process would not lead to an increase in efficiency.

8.3 Testing the Process Improvements with the Simulation Model – Answer RQ 9

Due to the limitations of the simulation model discussed in the previous chapter, not all process improvements can successfully be tested with the simulation model. For an explanation of the reasons why certain process improvements could not be tested with the simulation model, the reader is referred to Appendix 20 and the consequences/simplifications mentioned in Table 10 and Table 11. For all others (and also the ones who could be tested with the simulation model), the next paragraph will discuss the results of the expert assessment of all performance indicators.

Appendix 21 shows the results of the process improvements that have been tested with the simulation model. In the previous chapter it was explained that the simulation model is only used to test the influence of the possible improvements on the (total) lead-time of the improvements.

Firstly, the integration of the two separate business processes (as in the HSA-project) leads to a decrease in total lead-time of 10% (approximately 6 days), however, it (naturally) increases the lead-time of the Financial Statements. This decrease in total lead-time is less than was identified by business experts with interviews. However, because the interviews also lead to the conclusion that there is mostly quite a large time span between the two separate business processes (which is not included in the simulation model because there are no objective reasons identified for this), the largest gain is thus that this latter timespan is deleted from the business process.

The simulation model also predicted the (large) decrease in lead-time for the financial statements, when a compilation is only started when information is complete. A decrease in lead-time for the financial statements of 20% for the time needed to be able to send the concept version to the client is tested for improvements V and XIX and a decrease of 12% for the total time for a financial statement. For improvement XXI this is equal to respectively 9% and 7%. In addition, the Workshop (2012) also validated the importance of complete information and its influence on lead-time.

However, the simulation model lack some predictive capacity as the results of improvements XI (to remove the review of the financial statements by the tax specialist) and IX (to combine the separate activities within the planning & preparation phase) significantly increase the lead-time, while this is not logical. While removing the review of the tax specialist is likely to have no significant influence, the simulation model predicts an significant increase in lead-time of 11%. Moreover, to combine the separate activities in the planning & preparation phase it is not logical that an increase in 30-40% (20 days) is expected. Therefore, the simulation model is falsified regarding the elimination (or combination) of tasks, as this is apparently changing the structure of the simulation model to such an extent that it leads to significant different results.

Summarized, the results of the simulation model suggest that the completeness of information is an important variable influencing total lead-time. Moreover, the gain in lead-time for the integration of the business processes is likely to be appropriated to the time in between the two separate business processes - which is in the simulation model almost equal to zero - than in the business processes itself.

8.4 Testing the Process Improvements with the Expert Assessment – Answer RQ 9

The Workshop (2012) has also been used to let business experts value all separate process improvements. A survey was created containing statements (extracted from process improvement/principle claims) and possible process improvements. The participants had to state to which extent they agree with the statements (scale – unto ++) and what the impact would be of the mentioned process improvements on the five different performance indicators (also scale – unto ++). Afterwards, the scales have been transformed to a scale ranging from 1 to 5, such that averages could be calculated. The set-up of the workshop is explained in Appendix 1, which also contains a summary of the most important aspects that were identified during the discussion. The results of the survey are shown in Appendix 23, in which the values have been colored to quickly see the better (or worse) process improvements. When the survey was created, some simplifications/eliminations had to be carried out for being able to let the participants evaluate all process improvements; these are explained in Appendix 24.

Appendix 24 contains Table 27 and Table 28, in which the relationship is shown between the (in Table 13 mentioned) process improvements and the statements/improvements as mentioned in the survey. This same Table 27 presents the average scores per improvement, which are based upon the (in the survey mentioned) process improvements/statements. This table can be used to decide which process improvements are best to implement, according to the business experts and which are likely

to have a large negative effect on certain performance indicators. The recommendation for the best to be implemented process improvements are presented in the conclusions section of the next chapter. Table 14 and Table 15 shortly summarize the results of the expert assessment (and discussion). Table 28 of Appendix 24 furthermore summarizes the scores for each of the BPM principles used in this research.

In tables below, the process improvements are categorized according to their expected influence on the performance of the business process and their consecutive succession. Eight process improvements were identified as only having positive impacts, while four process improvements would have a positive influence on the efficiency (and lead-time), but it's implementation should be (slightly) adapted to the customer or employee. Others are likely to have a positive impact (6 improvements) or probably won't work (6 improvements) and 7 improvements are only likely to have a negative impact.

Table 14: Summary of Expert Assessment - Statements

Category	Effect of Process Improvement (**scores on statements**)	Process Improvements
Perfect	Scoring High (>4) on Efficiency	V, XXV, XXVIII
Efficient, but think about the employees	Scoring High (>4) on Efficiency but not good for knowledge development	**XXIII**
Could work	Scoring slightly positive (3-4) on Efficiency	XXI, **XXII**, XXVII
Probably won't work	Scoring averaged (2.5-3.5)	IX, **XXIX**, **XXX**, XXI
Keep it the same	Scoring slightly positive for current work situation	XX, XXVII

Bold improvements are (or can be) related to (/with) XBRL

Table 15: Summary of Expert Assessment - Process Improvements

Category	Effect of Process Improvement (**scores on all indicators**)	Process Improvements
Perfect	Scoring high (>4) on Efficiency & Lead-Time and lowering nothing else (>3), thus only advantages	**II**, V, **VII**, XIV, **XXXIII**
Efficient, but think about the customer	Scoring high (>4) on Efficiency but slightly lowering customer satisfaction (2.5-3)	I, **VI**, XXIV
Could work	Scoring slightly positive (3-4) on all indicators	XI, XIX, **XXXII**, **XXXIV**, XXXV
Probably won't work	Scoring averaged (2.7-3.2) on all indicators OR discussed as not applicable	XV
No real impact, & Moreover Employee resistance	Scoring very low (<2) on Employee Satisfaction and not having any significant advantage on other indicators (<3.5)	VIII, X, XIII, XIII a)
Don't do it	Scoring Low (<3) on *all* indicators, thus not any advantage	VIII, XIII

Bold improvements are (or can be) related to (/with) XBRL

For the meaning of the process improvement numbers the reader is referred to Table 13. Also in the tables the process improvements related to (or which can be implemented with) XBRL are shown in bold. In the paragraph below only the improvements related to XBRL are shortly discussed.

Using the tables it can be seen that most of the XBRL improvements could work, but there is no real significant improvement expected. However, no negative consequence is expected. For improvement XXII (using XBRL to automate the compilation from a digital administration and to automate the

completeness- and reconciliation checks) would significantly increase efficiency, but only the employees would be much harder to train in. Improvement VI to integrate with the financial accounting process of the client is in the current condition only possible with a Software-as-a-Service (SaaS) solution. It would be a significant improvement regarding efficiency, only letting the client use a SaaS solution is for most larger clients practically impossible because they have their own (more elaborate) administration software and Enterprise Resource Planning (ERP) systems. In the far future, XBRL GL would overcome this obstacle by which it will a significant positive improvement. Using XBRL (or current software functionalities) to carry out completeness and reconciliation checks before the compilation engagement is started (improvement II) and to subsequently let the client improve the administration when needed is a significant improvement. Moreover to integrate the business process of the accountancy and tax specialists department is also a significant improvement (improvement VII). Also thanks to the development of XBRL software developers have created (more) multi-purpose software applications. A significant improvement is to use as less as possible software applications keeping the same functionalities in a multi-purpose software application (XXXIII). In addition, XBRL could maybe help to eliminate some mistakes made when transporting information between applications or from a document (improvements XXIX and XXX). In addition, using XBRL validation checks would likely be an improvement (XXXIV). Lastly, there is still hesitation towards standardization of the data-formats (contents of the financial statements and the annual account scheme), by which this is not a significant improvement (XXXII).

8.5 Conclusions

Most of the principles that were identified in chapter 4 could be applied to the case study and consequently lead to a possible process improvement. Thirty-seven process improvements were identified, which are not completely different as some specify another or are a precondition for another. Next, all process improvements were specified by grouping them (in scenarios) and detailing their specific implementation in Appendix 14.

Next, the simulation model was analyzed to search if bottlenecks are apparent in the as-is situation, which could not be recognized. In addition, a statistical analysis was carried out to test if the influence of claims of certain principles (task composition, numerical involvement, and empowerment) could be identified. Unfortunately, because the data quality was not sufficient and still a large part of the variance was unexplained, it was not possible to draw real conclusions. Nevertheless, the data do suggests that the claims of the task composition & numerical involvement principles appeared to be true (more separate tasks & more persons involved leads to less efficiency). Subsequently, the discussion of fulfillment of the case study (CSFT process) to the preconditions (RQ 6) hindered the possibilities of the simulation model for testing all process improvements, which was explained in Appendix 20. The improvements that could be tested, lead to some identified impacts for the efficiency and lead-time of the business process. Still, some tests are based on added assumptions, thus limiting the quantitative nature of the conclusions. Besides, the predictive capacity of the simulation model is also partly falsified regarding the elimination and combination of tasks.

The created process improvements (and scenarios) have consequently been used to create a survey and design a workshop for scoring and discussing the different process improvements. The results suggested that some process improvements would only have a positive impact on the identified indicators and can therefore immediately be recommended for implementation. Others would have a negative impact on the customer- or employee satisfaction, meaning that when these process improvements would be implemented the negative consequences should be taken into account or the implementation should be adapted to overcome these negative impacts. The impacts of the suggested process improvements are discussed in the next chapter containing the conclusions.

Part D. Conclusions

9 Conclusions & Recommendations

This chapter firstly summarizes the answers to the sub research questions (RQ1 – RQ9). This will be followed by recommendations for process improvements for answering the first main research question. After this, guidelines for the choice of process improvements and recommendations for their implementation are presented for answering sub research question 10. Lastly, the main research questions will be answered and recommendations for future research will be stated.

9.1 Answering the sub research questions

The first research question aimed to characterize the accountancy domain and case study. A compilation engagement performed by an accountant is not an assurance engagement and therefore not directly subject to heavy regulation. Nevertheless, an accountant performing the process still has to deal with existing standards and financial reporting frameworks. The added value of the accountant is to increase the quality and reliability of the information inside the financial statement due to its expertise in accounting and financial reporting. The business process is a knowledge-intensive business process, which stands more for the accountant his work than the work of a tax specialist. Tax specialists do have to change financial figures, such that it fulfills the applicable reporting system for tax returns. The case study company (like many organizations in the accountancy sector) uses multiple different single-purpose applications for different steps in the business process. Moreover, an accounting firm is a service-based organization eventually providing the customer with an information product (financial statements and tax return). The 'production' and delivery of the service within an accounting firm is people intensive and deals with a variety of customer characteristics resulting in a high customization of the offered service. Clients of accounting firms (likely) have difficulties with evaluating the technical quality of the financial statements and tax return. Functional quality is (probably) more important, meaning that employees of an accounting firm often find it important to customize the process and information products according to the wishes of the client.

The second research question aimed to identify the most important relevant aspects of XBRL and SBR. An important finding is that while SBR is aimed at standardization of financial information, the largest amount of elements in the XBRL instance documents for the case study (financial statements and corporate income tax return) are self-defined by the granting organizations. This increases the difficulty of re-using data between the different departments. XBRL (and XML) offer technical validation of the instance document, but XBRL Formula also offers possibilities for validating the internal consistency of the instance documents, with predefined FRIS- or business rules. Lastly, the three different implementation strategies of XBRL are bolt-on, built-in and embedded. The bolt-on approach is the strategy mostly chosen for implementation (and equal to the current situation of the case study company), as it is the most easy and less costly strategy. The embedded approach in contrast, would have to be based on the not-yet fully developed XBRL GL, thus currently impossible. Only the built-in approach is still a possible process improvement and theoretically results in higher potential benefits, but needs higher investments.

Subsequently, for identifying process improvements BPM methodologies were selected (**third research question)** that are possible to guide the identification of process improvements. Based on literature it was immediately decided to choose for BPM methodology prescribing concretely how the process can be improved, but which also seems immediately likely to be applicable to the accountancy sector (and case study). This led to the decision of primarily using the set of 29 best-practices summarized by Mansar and Reijers (2005). These best-practices were primarily based upon

the work of renown scholars within the Business Process Reengineering (BPR) discipline, like Hammer and Champy (1993), Rupp and Russel (1994), Peppard and Rowland (1995) and Klein (1995). Becides these BPR oriented best-practices, the Theory of Constraints and Lean Manufacturing for the Services Industry were also chosen.

When having started the case study research, the applicable performance indicators had to be identified **for answering the fourth research question**, which would be used to test the performance of the business process and the influence of process improvements on this performance. Efficiency, lead-time, quality, customer- and employee satisfaction are the most important indicators. The quality is largely determined by the (proxies of the) amount of (completeness- and reconciliation) checks that the employee performs on the financial administration together with the checks regarding the validity of the administration (with reality). Moreover, the expertise of the employee compiling the financial statement (and thus carrying out these checks) is regarded as a determining factor for quality. Above all, it has been identified that (some) reviews are always necessary to guarantee the quality of the financial statements & tax return, as these (almost) always lead to necessary corrections. The customer satisfaction is largely based upon these same three indicators, thus representing conformity with the company-internal indicators. Lastly, the employee satisfaction is largely determined by the degree to which the work is regarded as challenging and thereby offering opportunities for knowledge-development.

Next, the business process has been modeled with BPMN **(fifth research question)** and subsequently a simulation model has been created. Due to the non-fulfillment of the case study (CSFT process) to some of the preconditions of RQ 6 (as will be explained in the next paragraph) the specification of the simulation model had to be simplified. This firstly resulted in limitations of the verification & validation of the simulation model. Secondly, it limited the possibilities of the simulation model for testing process improvements. Some limitations of the discrete event based simulation model (in Arena), like the impossibility for planning activities and for estimating future work pressure, made the model limited in reflecting reality. Nevertheless, (the judgment of) business experts validated the simulation model by which it can be used to test the process improvements for their influence on lead-time.

For answering the sixth research question it can be concluded that for the purpose of this research too less attention was paid to measuring the performance of the CSFT process, specifically in terms of efficiency and quality. In reality, no objective performance indicators are used to measure individual process performance and evaluations are largely based on subjective judgment of managers being involved with the concerning engagements. Some challenges were also identified with the quality of the data (specifically regarding completeness, validity and accuracy) of the hour-registration. Besides, it is (implicitly) accepted that mistakes are made in the business process, which likely lead to the fact that no real sources of errors are defined and no real procedures are created to drive these errors down. This is likely to be due to the high knowledge intensity of the business process, the applicability of principle-based regulation (NV COS 4410) and the resulting fact that assessing correctness is slightly subjective. Moreover, there is an extreme high variability identified in the business process, due to a plurality of customer characteristics, due to having a people intensive business process resulting in hard to quantify influences of human behavioral characteristics and due to personal preferences of employees. These factors have a high impact in process arrangement (set-up and resource allocation) and processing times, of which the first is forming the biggest challenge for adequately using a simulation model for applying BPM to the case study. In contrast, data was reasonably easy available and it was reasonably easy to define well-defined deliverables and the beginning and ending of the service process. Thus, the case study and CSFT process largely meets these preconditions.

Next, all the identified BPM principles were applied to the case study, resulting in an identification of 37 possible process improvements **forming the answer on the seventh research question.** It appeared that the case manager and customer teams best-practices (from BPR) are already standard applied within the accountancy sector, while the order types-, order assignment-, split responsibilities- and trusted-party best practices were not helpful for the identification of any process improvement. The simulation model was also analyzed for identifying possible bottlenecks. However, this did not lead to the identification of bottle-necks and therefore did not offer new information for process improvements (**for answering the eight research question**).

Some of the process improvements were tested with the simulation model, but all have been evaluated in an expert assessment to identify the (expected) influence of the, with theory, identified process improvements. These results are presented in the previous chapter **(forming the answer on the ninth research question)** which made it possible to evaluate the process improvements. The recommendations for process improvements are presented in paragraph 9.2 below.

9.2 Conclusions - Answering the Main Research Questions

The main research question with *practical relevance* guiding this research was as follows:

MRQ_1 : Which process improvements can be recommended for the process of compiling and submitting financial statements and tax returns (CSFT), for benefiting from the advantages that digitalization and standardisation can offer?

In the following paragraphs, the recommendations for process improvements are stated. The first couple of paragraphs describe a topic and can contain overall process improvements or specific XBRL, SBR and/or digitalization improvements. The recommendations specifically dealing with XBRL (/SBR) are highlighted with **XBRL/SBR** in the margin and recommendations dealing with general digitalization and/or task automation are highlighted with **D/TA** in the margin. Moreover, the BPM principle leading up to the improvement is put in bold. The subsequent paragraph 9.4 will conclude on the main research question with *scientific relevance*.

9.2.1 Prevent Working with Incomplete Information

Employees have to pay more attention to reduce the likelihood of having to request additional data and information during compilation, as it appears to have a significant negative consequence for the efficiency. Working with incomplete information should be prevented (**Lean**).

1. Carrying out an intensive check on the data & information before the compilation is started (**control addition**) likely reduces the likelihood of having incomplete information during compilation.
2. It is possible to make clients more responsible for delivering complete information (**control relocation**). For instance, by pointing them out that delivering incomplete information will result in higher cost and that he therefore should check himself that he has all information gathered. Only this will probably have a negative consequence for customer satisfaction, *but further research could point out for which cost incentive a client is willing to do this.*
3. A combination of the **control addition** and **control relocation** principles can be implemented using **task-automation** in two different ways (for both situations a cost incentive should be provided to the client):
    a. If a client provides the accounting firm with a XBRL file, he can already carry out much of the completeness and reconciliation controls of the financial administration using the automated XBRL checks (**task automation best-practice**). Thereby customers are given the opportunity to fix any mistakes themselves and controls are relocated towards the customer. **XBRL/ SBR**

b. Currently this can already been done using the automate checks in the available SaaS solutions for financial administrations (for the case study company this is the 'Samenstelassistent' in 'Accountview Online'). **D/TA**

4. **Integrating** with the business process of the client results in more up to date and continuously accessible information, resulting in a (much) shorter lead-time and a more efficient business process. This an be performed in two ways:
   a. Currently, it is only possible by letting the client use Software-as-a-Service (SaaS) for their financial administration. **D/TA**
   b. In the far future, it will be possible using XBRL GL. **XBRL/ SBR**
5. Sometimes an engagement is already deliberately started while it is known that not all information is available. This is done because accountants are 'waiting' for work, but can also be identified as a **Lean waste** for the services industry. *Further research should point out if this is desirable or if this should be prevented no matter what.*
6. Regarding 1c and 1d for letting the client use a SaaS application for their administration it is important to mention that most larger companies already have their own administration software (/Enterprise Resource Planning Software). This means that the use of a SaaS application is practically impossible for those clients. Still all clients could (and should) be encouraged to use a SaaS application for their financial administration. But, these problems can be overcome when XBRL GL is available. **D/TA** **XBRL/ SBR**

9.2.2 Improve the Response Time of Clients

Because the client is responsible for providing the accountancy firm with the needed information & data the principles within the customer-segment lead to the identification of significant problems. Firstly, poor responding customers make the business process inefficient and seriously lengthen the lead-time for those engagements. Besides, they also disturb the business process in its whole as they can hinder the compilation engagements for other clients. It also makes it (more) difficult for the tax specialists to fulfill to the deferral regime. All these inefficiencies and increased lead-times are **Lean** waste.

1. While **Lean Management** does prescribe to minimize waiting-times, it does not provide concrete support for improving it. None of the in this research identified and suggested improvements will lead to a significant improvement.
2. But the workshop did lead to the idea that maybe decisions should be made on a partner-level if the (always) poor responding clients are even wanted or that these clients should be rejected. This is important, because these clients are probably not even profitable. This suggestion relates to a possible implementation of the **knock-out** principle (number 11, as described in Appendix 13 on page 112). *Further research could point out which measures can be taken to make clients respond more quickly or which indicators will be used to knock out certain clients.*

9.2.3 Company Internal Integration of Business Processes and the Resulting Coordination Efforts (HSA-project)

The **numerical involvement** principle is initially not helpful as the **order assignment** and **customer teams** are already implemented within accountancy firms and because departments within accountancy firms are traditionally very independent. The improvements implemented within the HSA-project can be regarded as a combination of the **integration** and **parallelism** principles, forming a company internal integration. This improvement is to simultaneously compile the financial statements and tax return and is enabled due to the XBRL & SBR, which increased the possibilities for digitally sharing information between different departments (/disciplines) and employees. **XBRL/ SBR**

It significantly increases efficiency, lead-time and customer satisfaction and also has a positive impact on quality and employee satisfaction. However, due to this integration the **numerical involvement best practice** becomes very helpful for identifying improvements as coordination became much more important and sometimes appears to be problematic. In addition, tax specialists sometimes have difficulties with fulfilling to the tax deferral regime, by which it is even more important that the accountants and tax specialists collaborate better. It is therefore highly recommended that more attention is paid to supporting this coordination between the two departments and not to let the offices fully decide themselves on how to arrange this coordination, likely improvements are:

1. Accountants and tax specialists should always have access and to and use the planning functionality in BEAT-S. The planning has to be expanded with the possibility for defining time-slots in which the employee has to carry out a certain task, leading to less necessary personal communication. However, this also requires employees to follow the planning more strictly than currently. It is likely to improve efficiency, lead-time and employee satisfaction. **D/TA**
2. This can subsequently be expanded with WfMS functionalities to automatically inform employees to work on certain tasks as their time-slot has been reached or the deadline is approaching. **D/TA**

9.2.4 Process Improvements regarding the Safeguarding of Quality

Control addition (in the end of the chain) is already applied in extensive form, as it is the sole task of an accountant to 'enrich' the financial information and to be sure that the delivered information product is reliable and free of substantive errors. There is thus a plurality of reviews. However, it has been assessed that a review by a second (responsible) accountant is not always necessary (resulting in **Lean waste**). Especially for the smaller clients it is often redundant and can therefore result in a significant increase in efficiency when this review is eliminated. In addition, the review by the tax specialists does not often lead to important corrections. It is therefore questionable if this review is necessary and *further research could point out in which situations this review can be eliminated.*

1. **Lean** is also guiding the decision to include validation checks with XBRL Formula on XBRL instance documents (**control addition and task automation**). Waiting-times for reviews are **Lean waste** for the services industry, meaning that employees compiling a financial statement and/or tax return should carry out the automated XBRL checks themselves. In this way, an employee can immediately correct if needed, is more aware of his own work and will reduce the amount of time that the responsible tax specialist needs for reviewing. Because he can be certain that certain financial figures are already validated by the business rules. **XBRL/ SBR**
2. Within the case study company it is already possible to include any desired validation check or other business rule (because information is tagged in BEAT-S), especially for the tax return. *Also see recommendations for further research* **D/TA**

9.2.5 Process Improvements specific to Digitalization and Automation

1. The **integral technology** (and the specified variant **centralization**) principles are currently already (or being) implemented within the accountancy sector in the form of a digital file application, meaning that all employees can access the dossier from any physical location. Still a more intensive implementation of **centralization** is recommended.
    a. Especially the tax specialists find it very important that all documents are electronically archived (**Lean waste**). The tax specialists and accountants both recognize that it will lead to a higher employee satisfaction and both seem to identify that it can also improve efficiency. Moreover, the tax specialists also expect an increase in lead-time and quality. **D/TA**

2. Regarding **task automation and Lean waste** it appeared that not all accountants within the case study company are privy to all current automation possibilities. Besides, not all accountants always request an electronic administration of a client. Because using an **D/TA**

electronic administration is more efficient, all employees should from now on ask the client for their electronic administration (/auditfile).

9.2.6 Process Improvements specific to XBRL & SBR

Besides these process improvements, some process improvements specifically aim at the utilization of XBRL (by following the standardization of SBR and the Dutch Taxonomy) and the use of (new) software functionalities, these are:

1. Due to the developments of XBRL, traditional single-purpose software applications for accounting firms are slowly transforming into multiple-purpose software applications. Following **Lean** for retyping/re-entering data resulting into wasting time and introducing possibilities for errors, as less possible different software applications should be used. This also fits more in the XBRL vision for the 'store once-report many' concept and will increase efficiency and lead-time. **D/TA** **XBRL/ SBR**
    a. Recommended is to expand administration packages with available reporting functionalities (when available) and to eliminate the report-generator applications (like Caseware). This ensures that most of the financial information is no longer stored in multiple applications (and multiple locations). **D/TA**
    b. Surely, during the CSFT process, employees add information to the received financial administration or what should be included in the financial statements, but it is recommended to also store this in the financial administration itself and not in another application.
    c. Or XBRL can be implemented between these different applications to transport data between applications **XBRL/ SBR**

2. **Lean** also prescribes to data formats. This saves time because a new data format does not have to be created for every new administration. In addition, it saves time when an employee wants to compare information and when data has to be imported/exported or when information has to reviewed. This naturally relates to the whole standardization following (the Dutch Taxonomy of) SBR and reflects the built-in implementation strategy of XBRL. This would mean the standardization of the annual account scheme, the specifications, the structure/design of the financial statements and the recording of non-financial information based upon the Dutch Taxonomy. **XBRL/ SBR**
    a. Theoretically, it is claimed to be the best solution and will achieve more efficiency, but there still is hesitation in standardizing all these formats. Only a standardized (and centrally developed) annual account scheme is a likely improvement, but sill limited to an estimated 70% of all clients. Still, client incentives has to be identified, which could likely be cost-incentives. *Also see recommendations for further research*
    b. This also aligns better with the currently ongoing development of the NBA taxonomy for audit certificates. If a standardized annual account scheme is available, it can be expanded with this NBA taxonomy offering standard texts for the practitioner's report. In addition, this gives rise to the opportunity for internally developing a taxonomy consisting standard texts for explanatory notes and foundations, such that these are readily available for the accountant to choose. This will likely save the accountant even more time when compiling the financial statements. *However, the possibilities for implementing both these taxonomies should be researched further.*

2. Moreover, when the annual account scheme is standardized, additional benefits can be achieved. Namely, the increased possibilities for implementing automated checks and controls in the business process **(task automation)**. This saves the accountant time when assessing the sufficiency of the financial administration. **D/TA**

a. However, the implementation of these automatic checks and controls will have a negative impact on the knowledge development of assistant accountants. It is important to decide how this obstacle can be overcome. It should be decided which of the harder checks and controls, currently (often) carried out by the case manager due to its complexity, can be shifted towards the assistant accountants. Like for instance the checks on work in progress ('onderhanden werk') and the stock turnover ratio ('omloopsnelheid van de voorraaad'). The automated checks can namely support the assistant accountant for carrying out these checks by stating some indications or areas to focus on.

9.3 Summarizing Conclusions for Main Research Question with Practical Relevance

Summarizing the conclusions for the main research question with practical relevance - only regarding XBRL and SBR - it can be concluded that there are not much significant process improvements (identified). Firstly, the integration of the two separate business process (as in the HSA-project) due to the enhanced possibilities of sharing information between disciplines (due to SBR) and employees/departments (due to XBRL) is a significant improvement. Secondly, the possibility of relocating the completeness- and reconciliation checks towards the customer using XBRL (or other current software functionalities) is also a significant improvement. In addition, due to XBRL and SBR, software application developers have created more multi-purpose software applications, by which an accounting firm can reduce the amount of software applications used in the business process. It is a significant improvement to use less software applications as it reduces the need for transporting and transforming data between applications and the use of less applications reduces the complexity of the business process.

Lastly, additional benefits of XBRL can be achieved for an accounting firm when there are less obstacles towards standardization of the annual account scheme and other contents of the financial statements. Moreover, when XBRL GL is developed in the far future, a successful integration with the financial accounting process of the client can be achieved, resulting in a significant improvement.

9.4 Summarizing Conclusions for Main Research Question with Scientific Relevance

Besides all of the above suggested improvements with which also the concerning BPM principles were presented, some specific conclusions regarding the main research question can be stated. The main research question with scientific relevance guiding this research was as follows:

MRQ_2 : Which BPM principles are best applicable to improve the business process of compiling and submitting financial statements and tax returns (CSFT) for benefiting from the advantages that digitalization and standardisation can offer?

In the paragraphs below firstly some conclusions are stated regarding overall process improvements. This will be followed by the conclusions for the XBRL and SBR specific improvements.

Firstly, an accounting firm (and specifically the CSFT process) is knowledge-intensive and deals with a large variety of client characteristics. This means that employees should fully understand the client-specific characteristics to be able to efficiently (and with high quality) perform tasks in the business process. Therefore it is favored to let one (or at least as possible) employees work on the compilation engagement of a client. This means that the **order assignment**- and **customer team** principles are already usually applied within the accountancy sector. Furthermore, **specialization** towards lines of industry or towards the **exception** of clients with negative financial situations make further use of this focus on knowing client-specific characteristics. However, enough volume should be reached to

specialize towards these characterizations. Contrasting principles based on a larger impact of task-variability and building up expertise in tasks (like **triage**, the dividing variant of **task composition** and the **specialist-generalist** for tasks principles) are therefore negatively assessed and do not lead to improvements.

Secondly, an accounting firm as service-based organization increases the necessity of having a **case manager** involved with an engagement. As the process is (often) highly customized to the client, it is important to have an employee with high expertise and experience to manage this process. This importance of the case manager also identifies why the empowerment principle (empowering the employees and removing middle management: the case manager) and the matching Lean waste is not seen as a helpful principle. Moreover, because clients are more focused at experiencing and evaluating the functional service quality an case manager is needed to maintain the contact with the client.

Thirdly, the compilation of a financial statement often has a reasonably large lead-time of on average 2-2,5 months. In addition, activities are largely carried out following a planning and are not carried out as flow-based activities. These two characteristics mean that the **Theory of Constraints** was not helpful in identifying significant process improvements. Moreover, a **Theory of Constraint**-like improvement is already implemented, namely a case manager. Because the case manager also reviews documents and already solves as much of the problems possible, he reduces the burden of the more likely constraints (responsible and reviewing accountants), by which the latter thus not forms a significant constraint.

Summarized**, Lean** was very helpful in identifying problems existing in the business process, but for most cases, **BPR** provided the solution. Thereby **BPR** offers more concrete support for improving the process. **BPR** principles concerning the customers, the information and task automation appeared to be most helpful together with an adequate interpretation of task elimination specified by Lean. Moreover, the BPR principles based upon reaping the advantages due to knowing the specific client (and engagement) characteristics are already applied and the contrasting BPR principles were falsified. Moreover, the integration principle of BPR can be expanded with (the variant of) a company-internal variant as was applied in the case study. It is a significant improvement, for which XBRL and SBR were the main enablers, as they made it easier to share information between different disciplines, departments and employees.

Concerning XBRL and SBR it appeared that mostly the BPM principles in the customer and information segment - which are the **control addition, relocation** and **integration** principles - and the related Lean wastes are most useful. This is because these segments deal with the interaction and exchange of information with clients, which are the most significant parts of the CSFT process of an accounting firm. Moreover, the standardization following Lean largely prescribes to standardize all data formats using XBRL and SBR. This can lead to many possibilities for **task automation** and form significant improvements, but, as explained in paragraph 9.3, this currently still encounters obstacles.

9.5 Guidelines for Choice & Implementation of Process Improvements – Answer RQ 10

The process improvements that only have positive influence on the CSFT process, can be immediately recommended. However, this research was not aimed at researching the implementation costs of the process improvements. Future research should therefore point out the implementation costs and should aim to categorize the improvements regarding costs. The results of the process improvements together with the implementation costs can also be used to construct an MCDA-analysis. In such an analysis, all indicators receive a weight by which a preferred order can be calculated.

More important recommendations can be made regarding the manner of implementing the process improvements. During this research and the interviews held it appeared that with the current implementation of process improvements some obstacles exist. Firstly, the key-users of different offices do not seem to be fully privy to all possibilities offered by BEAT-S, such as for instance the functionalities of the monitoring-database. Secondly, it also appeared that key-users were not always immediately convinced about the advantages of current implementations. As the key-users are supposed to be an example for the different offices, it is not desirable that these key-users themselves are not even convinced. It is recommended that more attention is paid to informing and convincing the key-users about the functionalities and advantage of improvements. In addition, their fulfillment to the advocating-role as key-user should be investigated. A recommendation is to involve the key-users (more) with the development of new process improvements, by which it is likely that they get more involved and can be easier convinced about the advantages.

Another important recommendation regarding the implementation of process improvements is to better inform employees. From the interviews it appeared that not all employees are privy to automation possibilities already at hand (like 'Samenstelassistent' and the possibility for transporting data between Caseware and SDU). In addition, some employees deliberately choose to keep working on the 'old way' and simply take long to implement improvements. These factors must be taken into account when more process improvements (regarding automation) are implemented. This can possibly negatively influence the return on investment and/or the payback period. Therefore, it should also be decided if the freedom of employees (and offices) is possibly too large. It could be wanted that the decision-making power becomes more centralized, and also more hierarchically designed, by which employees are more obliged to follow certain changes. Future research could be aimed to identify which changes can be made to the culture within the company.

9.5.1 Recommendations for Future Research specifically for Case Study Company

Firstly, for the business rules that can be already incorporated in the current situation (in BEAT-S) for checking the validity of a Tax Return, research can point out which business rules are most important to implement. The multitude of responsible tax specialists can for instance be asked to submit their mostly used checks that they carry out when reviewing a tax return. It is highly likely that a large part of those checks are shared between the different responsible tax specialists. Consequently, it can be decided which checks can be automated and save much time and thus which will be incorporated in BEAT-S or similar application.

Secondly, certain reviews can be eliminated from the CSFT process, but future research should point out in which situations these reviews can be skipped. A standard procedure for a preceding risk assessment can be defined (depending on client characteristics and/or employee expertise) leading to the identification for the necessity of a review.

During the workshop also some other possible improvements were offered by the participants, namely increasing the responsiveness/speed and user friendliness of BEAT-S (by giving it a more graphical based interface). Besides, BEAT-S is sometimes regarded as a blanks exercise for the real small clients. It was suggested to develop some kind of 'BEAT-S Lite', being much less extensive. Further research could be carried out how the user-friendliness can be increased. Also further research should point out if, and how much, the speed of BEAT-S should be improved such that the speed does not cause irritations with end-users.

9.6 Limitations and Recommendations for Future Research

Firstly, this research only researched the applicability of BPR, Lean (for Services) and Theory of Constraints as BPM methods and after a short analysis disregarded others. Possibly, other BPM

methods are still available and offering concrete support for identifying process improvements in the accounting domain. Also of BPR the extra resources, outsourcing and flexible assignment principles were not successfully assessed. Future research could point out any possible advantages for an accounting firm of these principles. Also the (combining variant) of the task composition best practice was not assessed as a helpful best practice by the business experts, but is likely due to the fact that the business experts needed some more specific knowledge about the differences between executing multiple tasks as one activity or multiple.

Secondly, this research was based upon a single case study analysis for deriving process improvements and to validate these improvements. Although it seemed from multiple business professional sources (and Pieterson (2012)) that the set-up of accounting firms is largely the same, future research should be carried out to decide how representative the case study company is for the accounting sector. It is likely representative for other accounting firms aimed at SMEs and also even for accounting firms aimed at large-scale industry.

Thirdly, one (or a couple) standard annual account schemes should be developed that can be used across the whole organization. This development should firstly be based upon the taxonomy as offered by the Dutch Taxonomy Project. However, for a good development of this standard annual account scheme and sufficient support of stakeholders it is important to involve managers and employees within the whole organization as also the clients. Because some hesitation have been identified for standardizing annual account schemes, it is recommended to give hesitating employees the possibility to submit specific wishes for the annual account scheme based upon client engagements encountered. In this way, it can be researched which wishes are unique, or which seem to be shared among multiple clients across different offices. Consequently it can be decided how many standardized annual account schemes should be developed to be able standardize most clients their administrations.

The research towards annual account schemes relates with future research aimed at identifying customer segments. Because employees regard most clients as being unique, future research should identify customer segments having significantly different wishes. This will help to identify how many and what kind of annual account schemes are needed. A possible segmentation could for instance be as the list below. Depending on its results, such a research could also help to increase the willingness of accountants for standardization and their perception of the expected benefits of standardization.

1. High demanding clients – Clients desiring special attention and are willing to pay for a highly customized service and financial statement and the ability of asking for specific advice
2. Clients purely focused at costs – Clients purely aimed at receiving a low-cost (and thus standardized) service and financial statement, not needing advice or special attention.
3. Negotiable clients – Clients of which some are possibly willing to let go some specific wishes regarding possibilities for advice or customization or willing to let go some specific wishes regarding customization of the service and financial statement to receive a lower cost service and financial statements

9.7 Recommendations regarding RQ 6

The CSFT process did not fulfill to some of the at RQ 3 identified preconditions, which limited the use of a simulation model for applying BPM to the CSFT process. The unfulfilled preconditions are shown in Table 16 on the consequent page. Important in this table are the recommendations for similar future research, as well as specifically for the case study company, to fulfill to the preconditions.

Table 16: Preconditions not Fulfilled in Case Study Research and Recommendations

Preconditions not fulfilled:	Recommendations for fulfilment of preconditions for future research / case study company:
1. Data was available, but hard to retrieve from the electronic sources (due to low practicality) and hard to combine (due to a different level of measurement)	• The monitoring functionalities of the digital file application have to be presented in every view using a single identifier and using the same level. In addition, it should be decided and fixed on which level (company, holding or client group) the hours have to be registered within the hour registration • When these previous points have been achieved, possibilities exist for coupling both data sources and using business intelligence to create an overview of engagement details and performance
2. No objective judgments of efficiency are made within the company 6. Client difficulty is extremely variable and *strongly* affecting needed process times and the arrangement of the process (set up and employees). Not all independent variables (and relationships) could be identified and quantified	• Create a model to assess efficiency. To define the complexity of the client it has been identified that the number of components and amount of GLAs can be used. Also the maturity of the organization in its bookkeeping seems to be a determining factor for the client complexity, together with the line of industry of the company. All these indicators for client complexity should be identified (and quantified) in future research making it possible to more accurately assess the efficiency of the business process. On the other hand, for being able to assess efficiency it is also necessary to identify and quantify the performance expectation of specific (type of) employees, because of the (large) learning-effect identified
3. No data is stored about the quality of the products created 5. It is almost always necessary to make corrections in the review phase of the process, it is (implicitly) regarded as normal and accepted that mistakes are made during compilation. Indeed, no use of flowcharts and process maps of the CSFT process.	• A first possibility is to include a code in the hour-registration for making corrections. In this way it can be tracked how much time is spent on correcting, by whom this is done and in which stage of the process it has been performed. • Secondly, the results of the validation checks being currently performed on the tax returns (by the external XBRL service provider) should be stored in the digital file and should also be included in the monitoring database. These results can be used to assess how many errors are made in the tax returns and by which employees they are made. In the future (when implemented), the validation checks of the financial statements can also be included. • Both of the above can be used to create a procedure to drive down errors and make it possible to measure the quality of the products.

4. Data from the hour-registration was often incomplete (sometimes missing information), invalid (often wrong/general codes), inconsistent (employees registered their hours in different ways) and not completely accurate (registered other than real life situation)	• A standard procedure for the registration of hours by employees should be developed and employees should be pointed out that they are obligated to follow this procedure, be explained of its goal and are explained of its importance. As a result, data of the hour-registration will be more complete, valid and consistent and thereby offering a good instrument for measuring process performance. The procedure should at least contain: a. Explanation of codes under which activities have to be registered together with guidelines for filling in the work description. b. The importance of choosing the valid financial year. c. It should also be included in the procedure on which level (company, holding or client group) the hours have to be registered. • To retrieve more complete, valid and accurate data regarding processing times it is suggested to use observational research. Because during this research it also appeared that there are too many variables to be able to accurately let business experts make estimations about processing times. Such an observational research should also take into account the large variability encountered in client and employee characteristics. Also taken into account that the average lead time of the business process is 2,5 months it is recommended that approximately 3 fulltime months should be spent on carrying out observations.
7. Offices, Responsible Accountants, Case Managers and even Assistants all have personal preferences *strongly* affecting the arrangement of the process (set up, employees and applications used)	• Employees within an accounting firm should carry out their work by more intensely following a standard procedure/workflow. Although this improvement has been assessed by business experts negatively, it is necessary for being able to successfully apply quantitatively aimed BPM methodology. When employees work more by following a standard procedure it is also easier to correctly fill in the hour-registration and to synchronize codes of the hour-registration with specific steps in the procedure. The procedure should for instance prescribe when to request a digital file, when to use which application, when and how to use the working program and digital file application and which employee type (/function level) has to carry out which tasks (and when) in the business process.
8. Sometimes time-pressure or employee characteristics/preferences make employees decide to postpone or advance specific clients or to eliminate/postpone certain reviews	

10 Reflection

The preceding chapters presented the conclusions and most important recommendations following this research. However, a (personal) reflection on this research is needed to be accurately value the outcomes of this research and for myself to identify learning-points. Before stating some reflections, it is important to explain how this thesis project started. Initially I had focused on writing a research proposal for the case study company aimed at fulfilling their wishes. Simultaneously, it was very important to identify what the scientific contribution of my research could be that is related to the more practical relevance of this research. Consultations with my first and second supervisor lead me to several possibilities for the scientific research contribution of which to choose from. Eventually, I chose to identify the BPM principles best applicable for improving the CSFT process for utilizing standardization formats like XBRL and SBR and for reaping the benefits of digitalization in general. I hereby passed by the possibility of having a scientific contribution related to simulation and decided to only use the simulation technique as a research method.

10.1 Reflection on Research Process – Research Methods and Simulation Study

Looking with hindsight to writing this research proposal, I have to conclude that the then available knowledge was too limited to precisely comprehend the case study and to be able to state the exact research methods that would be retained during the entire research. From the start of the project (from as soon as the preliminary meeting), a simulation model was namely chosen as research method. Although being learned in the curriculum to always critically assess the research problem and method initially identified, I have not critically assessed it. Surely, I briefly researched if a simulation study would be possible, but after having identified the hour-registration and monitoring-database as possible data-sources and having the possibilities of interviewing business experts to identify procedures and process times I decided that it would be possible. But, I did immediately recognized that the research process is not exactly a simulation study, as the simulation model would probably not be used to identify process improvements, but to test the, with theory identified, process improvements.

With hindsight, it appears that successfully carrying out a quantitatively aimed BPM research using a simulation model could be doubtful from the beginning. As many scholars have identified, there are many challenges associated with applying quantitative techniques to service-based organizations, especially when it is associated with high knowledge intensity and large customization. Above all, the high variability in the process arrangement (set-up and resource allocation) depending on many hard to quantify client and employee characteristics together with the large variety in client difficulty still unexplained, was in my opinion forming the largest hurdle for successfully creating a simulation model. This led to a simulation model with limited possibilities for testing process improvements.

For the collection of data regarding processing times, I had chosen to use the hour-registration and interviews as source. It is important to mention that this choice have had a large influence on the success of the simulation model and quantitative research. A better choice for the collection of data would have been to manually collect it via observational research. Because the effort needed for such a research exceeds the available time for the master thesis project I did not choose this method. Still it is important to acknowledge that the limitation of my research is heavily dependent upon the research methods chosen. Besides, it is also important to recognize that firstly the business process was fully conceptualized and (largely) validated before I started to analyze the data to be used for specifying the conceptual model in the discrete event simulation. Only then, I had a clear insight of the quality of the data in the hour-registration and the large lack of detail compared to the conceptual model. This approach meant that I do have a comprehensive and validated conceptual

model according to the opinion of business experts (of how it should be), but that reality is much more variable and tough than this conceptual model.

10.2 Reflection on Research Process – Research Scope

Looking with hindsight to the research I'm in the opinion that the eventual scope is too large for a master thesis project. Looking back at this research, I think that in my case this has to do with having two different clients of the master thesis project. While the TU Delft may have had a preference for a more intense focus on XBRL, the external company was clear in wanting to have a broader scope for overall process improvements. Combined with the fact that during this research it appeared that quantitative validation of (XBRL) improvements appeared to be very difficult, this resulted in the fact that I defined a broader scope of this research. This resulted in a more encompassing research to overall process improvements, but went at the price of the level of detail. This consequently had an impact to the possibilities for quantitative research, as this also exponentially increased the volume of data needed. As almost each type of improvement would need additional data to be gathered (manually). The details which have been lost is primarily the loss of identified processing times for activities within sub process 2 and 3 and the causal relationships between the implementation of XBRL and its effect on the efficiency and quality. Also the client difficulty could not be conceptualized and specified completely.

Besides, the challenges encountered with the simulation study (and with hindsight also the large scope of this research) lead to a change of plans. I decided halfway to also try to perform more statistical analysis and more intensely use the opinion of business experts (via a survey and workshop). This thus resulted in the use of three different research methods, resulting in a high effort regarding time. While a normal thesis project could also be based upon only one of these three research methods. Surely in such a case, one research method is likely to be applied more intensively.

10.3 Reflection on the (Quantitative Validation of) Process Improvements

Due to the non-fulfillment of the case study (CSFT process) to the preconditions for successfully using a simulation model for applying BPM, the results and conclusions were eventually more of qualitative nature. Although the plan was to offer quantitative results for being able to state (more) indisputable recommendations for improvements, the change of plans (more intense survey and workshop) surely helped to substantiate the results acquired with principally using theory. Thereby I do think that I achieved substantiated and validated outcomes, and thus valuable results.

While the improvements of the case study research are aimed the case study company, the suggested overall process improvements could be applicable to any accountancy firm. And the specific improvements regarding XBRL, when not holding on to the specific software applications mentioned, act as guidelines for any accounting firm when implementing XBRL. Specifically for the case study company, the recommendations for the implementation regarding how to involve and handle key-users and employees are very important. Lastly, it was wise (following advice) to have included an additional research question about the preconditions needed for successfully using a simulation model for applying BPM to highly customized and knowledge intensive service processes (in the accountancy sector). By having clearly identified to which preconditions the case study did not fulfill (depending on which characteristics of the accountancy sector and business process), existing theory was validated and reasons are clearly explained. In addition, I stated clear recommendations to accurately perform such a research in the future, which are valuable for the case study company and similar future research in the same domain.

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Part E. Appendixes

Appendix 1. Best Practices identified by Reijers and Mansar (2005)

Framework components	Best practice name	Definition
Customers	Control relocation	Move controls towards the customer
	Contact reduction	Reduce the number of contacts with customers and third parties
	Integration	Consider the integration with a business process of the customer or a supplier
Products	None	
Operation view	Order types	Determine whether tasks are related to the same type of order and, if necessary, distinguish new business processes
	Task elimination	Eliminate unnecessary tasks from a business
	Order-based work	Consider removing batch-processing and periodic activities from a business process
	Triage	"Consider the division of a general task into two or more alternative tasks" or "consider the integration of two or more alternative tasks into one general task"
	Task composition	Combine small tasks into composite tasks and divide large tasks into workable smaller tasks
Behavioural view	Resequencing	Move tasks to more appropriate places
	Knock-out	Order knockout decisions in a decreasing order of effort and in an increasing order of termination probability
	Parallelism	Consider whether tasks may be executed in parallel
	Exception	Design business processes for typical orders and isolate exceptional orders from normal flow
External environment	Trusted party	Instead of determining information oneself, use results of a trusted party
	Outsourcing	Consider outsourcing a business process in whole or parts of it
	Interfacing	Consider a standardized interface with customers and partners
Organisation: structure	Order assignment	Let workers perform as many steps as possible for single orders
	Flexible assignment	Assign resources in such a way that maximal flexibility is preserved for the near future
	Centralization	Treat geographically dispersed resources as if they are centralized
	Split responsibilities	Avoid assignment of task responsibilities to people from different functional units
	Customer teams	Consider assigning teams out of different departmental workers that will take care of the complete handling of specific sorts of orders
	Numerical involvement	Minimize the number of departments, groups and persons involved in a business process
	Case manager	Appoint one person as responsible for the handling of each type of order, the case manager
Organisation: population	Extra resources	If capacity is not sufficient, consider increasing the number of resources
	Specialist-generalist	Consider to make resources more specialized or more generalist
	Empower	Give workers most of the decision-making authority and reduce middle management
Information	Control addition	Check the completeness and correctness of incoming materials and check the output before it is sent to customers
	Buffering	Instead of requesting information from an external source, buffer it by subscribing to updates
Technology	Task automation	Consider automating tasks
	Integral technology	Try to elevate physical constraints in a business process by applying new technology

Appendix 2. Ten types of waste for the Service Industry

This appendix briefly shows a list of the ten types of waste for the service industry which are defined by Bonaccorsi et al. (2011):

1) Defects: Data entry errors; Lost files; Lost or damaged goods
2) Duplication: Data re-entering; Multiple Signatures; Unnecessary Reporting; Multiple Queries
3) Incorrect Inventory: Stock out, Wasting time finding what was needed; Unnecessary copies
4) Lack of customer's focus: Unfriendliness; Rudeness; Poor attention to the customer
5) Overproduction: Reports no one will ever read; Processing paperwork before time
6) Unclear communication: Incorrect information, Lack of standard data format; Unclear work flow
7) Motion/Transportation: Poor layout; Ineffective filing; Poor ergonomic
8) Underutilized Employees: Inadequate tools; Excessive bureaucracy; Limited authority
9) Variation: Lack of procedures; Lack of standard formats; Standard time not defined
10) Waiting/Delay: Waiting for approvals; Downtime; Waiting for supplies

Appendix 3. TOC Applications and Principles

This appendix shows the TOC applications and principles mentioned by Ricketts (2011).

1) Standard applications applicable for all domains/systems
    a. *Drum-Buffer-Rope (Production Principle)*
    b. *Replenishment (Distribution Principle)*
    c. *Critical Chain (Project Principle)* **(not a process improvement principle)**
    d. *Throughput Accounting (Measurement Principle)* **(not a process improvement principle)**
2) TOC principles guiding investigations of cause-and-effect as well as the design of solutions to core problems:
    a. *Weakest Link Principle*
    b. *Pull Principle*
    c. *Optimization Principle*
    d. *Aggregation Principle*
    e. *Core Problem Principle*
    f. *Policy Constraint Principle*
3) State of the art innovations in TOC
    a. TOC Applications for Goods
        i. *Simplified Drum-Buffer-Rope (Production Principle)*
        ii. *Synchronized Replenishment (Combined Production & Distribution Principle)*
    b. TOC Applications for Software
        i. *Agile Management for Software Engineering (adapted TOC applications for software projects where inventory is intangible)*
    c. TOC Applications for Services
        i. *Replenishment for Services (TOC application for Resource Management)*
        ii. *Critical Chain for Services (TOC application for Project Management)* **(not a process improvement principle)**
        iii. *Drum-Buffer-Rope for Services (TOC application for Process Management)*
        iv. Throughput Accounting for Services (TOC application for Service Measurement) **(not a process improvement principle)**

Appendix 4. Model of Applications and Information Flows/Objects (As-Is Situation)

- Not in Public Version -

Appendix 5. Information models of a Financial Statement & Corporate Income Tax Return

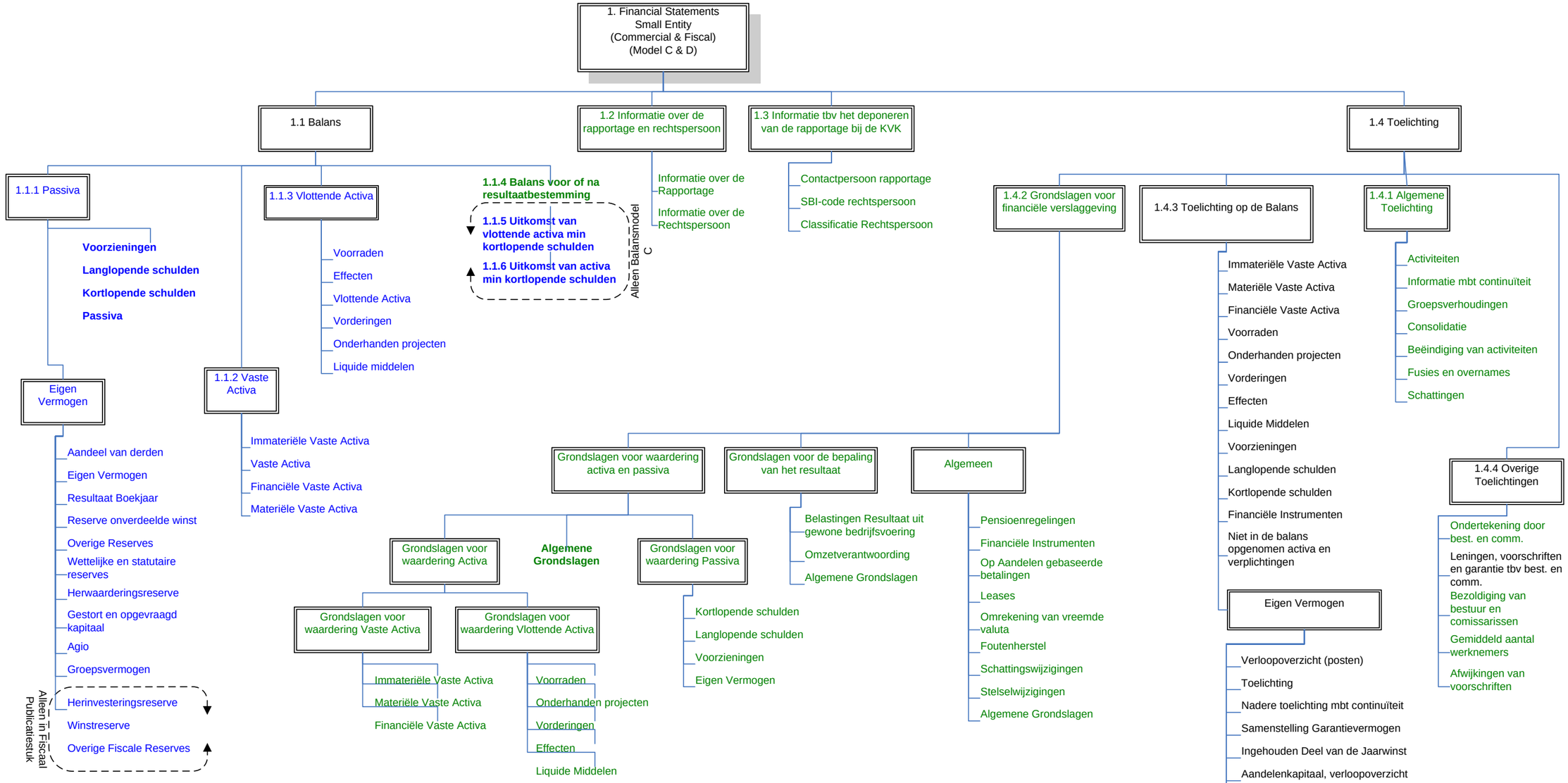
This appendix shows graphical representations of two forms of the Financial Statements, for a small entity and for a medium sized entity, and of the Corporate Income Tax Return. The graphical representations, shown on the subsequent pages, are based upon the Dutch Taxonomy (NT) version 6.0 (2012) applicable for financial reports about the year 2011.

For the creation of the information models some generalizations have been made. The difference in the information models between blocks with texts and normal text is not fully comparable with a difference in the NT. I have made this difference only to use blocks as a visual representation of a 'parent' containing different underlying items ('children'). This relation, between 'parents' and 'children', does also exist in the NT, meaning that the structure is indeed the same.

But care has to be taken that a 'parent' and a 'child' in the following information models can both contain as many information elements possible. A block is naturally never the representation of one single information element in the NT, but normal text in the information model can represent one information element in the NT, but might as well represent up to, for instance, 20 elements.

The choice that have been made for deciding if a 'parent' is not shown as a 'child', is if it contains multiple significantly different underlying information elements, while a 'child' always consist out of (more or the less) comparable elements. While creating these information models this primarily meant that monetary values have been detailed into more detail than string values. This is because the information elements containing monetary information are more important to comprehend for creating the business process models, than the information elements containing string values.

Also in some cases there were so much information elements containing string values for the same parent (although differently), that they have been summarized into one text-field ('Overige …') to keep the models orderly. Moreover, the information models have been created in Dutch, because translating all elements would lead to unclear translations.



Legend:
Blue text = Monetary Values
Green text = String Values
Black text = Combination of Monetary & String Values

Texts are bold to indicate that they are on the same level as the other blocks.

1. Financial Statements Medium-sized Entity (Commercial & Fiscal) (Model C & D)

1.1 Balans

1.1.1 Passiva

Voorzieningen

Langlopende schulden

Kortlopende schulden

Passiva

Eigen Vermogen

- Aandeel van derden
- Eigen Vermogen
- Resultaat Boekjaar
- Reserve onverdeelde winst
- Overige Reserves
- Wettelijke en statutaire reserves
- Herwaarderingsreserve
- Gestort en opgevraagd kapitaal
- Agio
- Groepsvermogen

Alleen in Fiscaal Publicatiestuk

- Herinvesteringsreserve
- Winstreserve
- Overige Fiscale Reserves

1.1.2 Activa

1.1.2 Vaste Activa

- Immateriële Vaste Activa
- Vaste Activa
- Financiële Vaste Activa
- Materiële Vaste Activa

1.1.3 Vlottende Activa

- Voorraden
- Effecten
- Vlottende Activa
- Vorderingen
- Onderhanden projecten
- Liquide middelen

1.1.3 Balans voor of na resultaatbestemming

1.1.4 Uitkomst van vlottende activa min kortlopende schulden

1.1.5 Uitkomst van activa min kortlopende schulden

Alleen Balansmodel C

1.2 Bestuursverslag

- Bestuursverslag
- Algemene Informatie
- Financiële Informatie
- Overige Informatie
- Ondertekening

1.3 Informatie over de rapportage en rechtspersoon

- Informatie over de Rapportage
- Informatie over de Rechtspersoon

1.4 Informatie tbv het deponeren van de rapportage bij de KVK

- Contactpersoon rapportage
- SBI-code rechtspersoon
- Classificatie Rechtspersoon

1.5 Kasstroomoverzicht

- Vrijstelling
- Kasstromen uit operationele activiteiten
- Kasstromen uit investeringsactiviteiten
- Kasstromen uit financieringsactiviteiten
- Mutatie in geldmiddelen

1.6 Overige Gegevens

- Statutaire regeling omtrent de winst
- Resultaatbestemming
- Statutaire regeling omtrent de bijdrage in een tekort
- Gebeurtenissen na balandatum
- Nevenvestigingen

1.7 Toelichting

1.7.1 Algemene Toelichting

- Activiteiten
- Informatie mbt continuïteit
- Groepsverhoudingen
- Consolidatie
- Beëindiging van activiteiten
- Fusies en overnames
- Schattingen

1.7.2 Grondslagen voor financiële verslaggeving

Grondslagen van het kasstroomoverzicht

Algemeen

- Pensioenregelingen
- Financiële Instrumenten
- Op Aandelen gebaseerde betalingen
- Leases
- Omrekening van vreemde valuta
- Foutenherstel
- Schattingswijzigingen
- Stelselwijzigingen
- Algemene Grondslagen

Grondslagen voor waardering activa en passiva

Algemene Grondslagen

Grondslagen voor waardering Activa

Grondslagen voor waardering Vaste Activa

- Immateriële Vaste Activa
- Materiële Vaste Activa
- Financiële Vaste Activa

Grondslagen voor waardering Vlottende Activa

- Voorraden
- Onderhanden projecten
- Vorderingen
- Effecten
- Liquide Middelen

Grondslagen voor waardering Passiva

- Kortlopende schulden
- Langlopende schulden
- Voorzieningen
- Eigen Vermogen

Grondslagen voor de bepaling van het resultaat

- Belastingen Resultaat uit gewone bedrijfsvoering
- Omzetverantwoording
- Algemene Grondslagen
- 31 Toegevoegde Grondslagen tov Klein rechtspersoon

1.7.3 Toelichting op de Balans

- Immateriële Vaste Activa
- Materiële Vaste Activa
- Financiële Vaste Activa
- Voorraden
- Onderhanden projecten
- Vorderingen
- Effecten
- Liquide Middelen
- Voorzieningen
- Langlopende schulden
- Kortlopende schulden
- Financiële Instrumenten
- Niet in de balans opgenomen activa en verplichtingen

Eigen Vermogen

- Herwaarderingsreserve
- Wettelijke en Statutaire Reserves
- Overige Reserves
- Reserve niet verdeelde winsten
- Resultaat Boekjaar
- Groepsvermogen
- Aandeel van derden
- Verschillen in het EV en het resultaat tussen enkelv. & gecons. jaarrekening
- Verloopoverzicht (posten)
- Toelichting
- Nadere toelichting mbt continuïteit
- Samenstelling Garantievermogen
- Ingehouden Deel van de Jaarwinst
- Aandelenkapitaal, verloopoverzicht
- Aandelenkapitaal, toelichtingen
- Agio

1.7.4 Toelichting op het Kasstroomoverzicht

1.7.5 Toelichting op de W&V rekening

- Netto-omzet
- Overige Bedrijfsopbrengsten
- Brutomarge
- Verkoopkosten
- Algemene Beheerskosten
- Personeelsbeloningen
- Afschrijvingen op imat & mat VA
- Waardeveranderingen van imat & mat Vaste A
- Waardevermindering van Vlot. A
- Overige bedrijfskosten
- Som van de bedrijfskosten
- Som der kosten
- Netto-omzet resultaat
- 14 Overige resultaten, baten en belastingen

1.7.6 Overige Toelichtingen

- Ondertekening door best. en comm.
- Leningen, voorschriften en garantie tbv best. en comm.
- Bezoldiging van bestuur en comissarissen
- Gemiddeld aantal werknemers
- Afwijkingen van voorschriften
- Bijzondere posten
- Veranderingen in de indeling van de balans of V&W
- Dienstverlening uit hoofde van concessie
- Op aandelen gebaseerde betalingen
- Accountantshonoraria

1.8 Winst & Verliesrekening

- Brutomarge
- Lonen en Salarissen
- Sociale Lasten
- Pensioenlasten
- Afschrijvingen
- Waardeveranderingen en -verminderingen
- Vrijval
- (Overheids)subsidies
- Andere rentebaten & soortgelijke lasten
- Rentelasten en soortgelijke kosten
- (Belasting)Resultaten
- Aandeel in winst/verlies
- Buitengewone baten en lasten
- Winst per aandeel

Legend:
Blue text = Monetary Values
Green text = String Values
Black text = Combination of Monetary & String Values

Texts are bold to indicate that they are on the same level as the other blocks.

- Corporate Income Tax Return (Reguliere Aangifte Vpb)
  - 1.1 Algemeen Deel
    - **1.1.1 Algemeen Deel**
    - 1.1.2 Toelichting
      - **Niet aftrekbare bedragen vpb**
      - **Vragen in verband met de fiscale eenheid**
      - Algemene Gegevens Vpb
        - Herbeleggingsreserve
        - Afrondingsreserve
        - Egalisatie/Calamiteiten reserve
        - Rechtshandelingen met buitenlandse aandeel-houders
        - Overige
  - 1.2 Algemene Gegevens Identificatie
    - 1.2.1 Algemene Gegevens Aangifte (Voorblad)
      - Ondertekenaar
      - Belastingplichtige
      - Consulent-adviseur
    - **1.2.2 Berichtgegevens**
  - **1.4 Carryback**
  - 1.5 Fiscale Winstberekening
    - Kapitaal- of vermogensvergelijking
    - Vrijgestelde winstbestandsdelen
    - Wijzigingen in toelaatbare reserves
    - Niet atrekbare rente
    - Toelichtingen op kapitaal- of vermogensvergelijking
    - Deelnemingsvrijstellingen
    - Belastbaar bedrag, opstelling vennootschapsbelasting
    - Belastingbedrag voor aftrek
    - Van aftrek uitgesloten en beperkte kosten en lasten
    - Totaal aftrekbare giften
  - **1.6 Innovatiebox**
  - 1.7 Specificaties
    - 1.7.1 Specificatie Fiscale Eenheid
      - Dochtermaatschappijen, voeging
      - Dochtermaatschappijen, ontvoeging
      - Dochtermaatschappijen, beëindiging door ontbinding en vereffening
    - 1.7.2 Specificatie Buitenlandse Resultaten
      - Vrijstelling wegens buitelandse winst
      - Verrekening wegens buitenlandse bronbelasting
      - Voorkoming van dubbele belasting door verrekening wegens buitenlandse passieve winst
      - Aftrek elders belast
    - 1.7.3 Specificatie Agrarische Activiteiten
      - Toelichtingen
        - Afwijkende landelijke Landbouwnormen
        - Vervreemding/ Onttrekking grond
      - Specificatie Agrarische Activiteiten, Vragen - Balans- en resultatenrekening
        - Specificatie Agrarische Activiteiten, Vragen Balans- en resultatenrekening
          - Immateriële Vaste Activa (=Productierechten)
          - Materiële Vaste Activa (=Dieren, plant- en boomgoed, enz.)
          - Voorraden (=Dieren, bloembollen, chamg., enz.)
          - Opbrengstsen (=Subsidie, werk voor derden, voergeld)
        - **Specificatie Agragische Activiteiten, algemene gegevens**
    - **1.7.4 Specificatie Aandeelhouders, adres+naam**
    - **1.7.4 Specificatie Aandeelhouders, bedragen**
    - **1.7.5 Specificatie Deelnemingen**
    - **1.7.6 Specificatie Houdster-Licentie- Financierings- en overige activiteiten**
    - **1.7.7 Specificatie Investeringsaftrek**
    - **1.7.8 Specificatie Winst uit zeescheepvaart**
  - 1.3 Balans- en Resultatenrekening
    - **1.3.1 Algemene Gegevens per onderneming**
    - 1.3.2 Activa
      - Vaste Activa
        - Immateriële Vaste Activa
        - Materiële Vaste Activa
        - Financiële Vaste Activa
      - Vlottende Activa
        - Voorraad vlottende activa
        - Kortlopende vorderingen
        - Effecten
        - Liquide middelen
    - 1.3.3 Passiva
      - Eigen vermogen/ ondernemingsvermogen
      - Voorzieningen
      - Langlopende schulden
      - Kortlopende schulden
    - 1.3.4 Verlies- en winstrekening
      - **Bedrijfsopbrengsten**
      - **Financiële Baten**
      - **Financiële Lasten**
      - **Buitengewone bedrijfsbaten**
      - **Buitengewone bedrijfslasten**
      - Bedrijfslasten
        - Kosten grond- en hulpstoffen
        - Personeelskosten
        - Ontvangen uitkeringen en subsidies fiscaal
        - Afschrijvingen
        - Waardeveranderingen
        - Overige bedrijfskosten
    - 1.3.5 Toelichting Balans
      - Toelichting immateriële activa
      - Toelichting materiële activa
      - Toelichting ondernemersvermogen
      - Toelichting voorzieningen
      - Schulden omzetbelasting, specificatie
      - Toelichting op balans activa
      - Toelichting op balans passiva
    - 1.3.6 Toelichting winst- en verliesrekening
      - Afschrijving bedrijfsgebouwen
      - Willekeurige afschrijvingen op bedrijfsmiddel in Nederland

Legend:
Blue text = Monetary Values
Green text = String Values
Black text = Combination of Monetary & String Values

Texts are bold to indicate that they are on the same level as the other blocks.

Appendix 6. Process Models of the As-Is Situation

- Not in Public Version -

Appendix 7. Data collection from the monitoring database for data input

- Not in Public Version -

Appendix 8. Explanation of the process of Data collection & Preparation from the hour-registration and encountered problems

Some steps have been followed to be able to collect the needed data. The hour-registration formed the most important input for this step together with the monitoring database of BEAT-S. Also in interviews business experts/participants were asked about the approximate times needed to carry out certain activities. Below, the data collection from all these sources is discussed separately.

Deciding on the contents and size of the data set

Moreover, on basis of the monitoring database a selection has been made for the dossiers (/clients) to be taken into account for the data analysis. On the 6th of June all finished dossiers of BEAT-S have been selected, this were over 1000 dossiers. But multiple dossiers belong to one client(group), as explained in the next paragraph, therefore it had to be checked which client groups had all of its dossiers (/components) completed. This was a total of 325 client groups consisting out of 608 dossiers. Consequently, because requesting 325 client groups was practically too much for the case study company to fulfill the data request (within the given time), a random selection of 220 client groups was chosen from these 325 client groups. The data of these 220 client groups were requested and acquired.

Data collection from the monitoring database of BEAT-S

The monitoring database of BEAT-S registers multiple aspects of each digital dossier/file of a financial statement. The relevant (used for this research) aspects which are stored in the monitoring database are the following:

1. Company & Client-Group identifier (name + number)
2. Number of sections (journal entries) in the financial statement for the concerning company
3. Number of work instructions (selected/deselected/created) in the working program for the concerning company
4. Material value (‘materialiteit’) of the concerning company
5. Nature/Foundation of financial statement (Commercial/Fiscal)
6. Type of Tax Return (Corporate Income Tax Return) (Single or consolidated)
7. Date of Practitioner’s Report
8. Date of sending the Tax Return

All these information was stored in multiple locations. Therefore, to be able to analyze this data, some data preparation was needed. All information had to be coupled and stored in a single worksheet. Microsoft Excel was used to couple this data on basis of multiple unique identifiers (name and/or number). Consequently all above standing information was presented in a single work sheet, where each row represented a company and each column represented one of the aspects in the list above.

Data collection from the hour-registration

The hours are registered by the employees for a certain client. The employees working for the client register their hours themselves for this client and fill in the applicable service (‘dienst’) and working (‘werk’) code. The service-code applicable to the creation of the financial statement is code 21 and for a corporate income tax return it is code 32. The relevant data that is stored in the hour-registration is as follows:

1. Applicable Office

2. Employee type (assistant accountant, managing accountant, tax specialist, etc.)
3. Group identifier
4. Client identifier
5. Service-code (relevant codes are 21 AND 32)
6. Working-code (specified activity like 'Meeting Client' or 'Working out the trial balance', etc.)
7. The applicable book keeping year of the client
8. Time spent on the concerning activity
9. Description of work (not obliged, though often done)

When the data set was retrieved it appeared that a number of problems arose which have to be overcome before the data can be analyzed. The problems that were encountered were:

- ***Problem 1:*** The concerning bookkeeping year is sometimes wrongly registered. Sometimes it is registered as the year the activity took place, while it concerns the bookkeeping year of the year before. This could be seen in the description of work.
  Solution: Finding years in the description of work and altering the bookkeeping year to the right year
  Solution: Comparing the total hours spent on the engagement in both years and when there was a high discrepancy it required further manual research to decide which was correct and which wasn't
- ***Problem 2:*** Dossier-Costs that were attributed to the client are registered at code 21
  Solution: Searching for Dossier-Costs in the description fields and removing them from the data set
- ***Problem 3:*** Other Tax Returns are registered ad code 21, like the (Personal) Income Tax Return and V.A.T.
  Solution: Searching for these types of activities in the description fields and removing them from the data set
- ***Problem 4:*** Activities for creating statistical data for Statistics Netherlands are registered at code 21
  Solution: Searching for these types of activities in the description fields and removing them from the data set
- ***Problem 5:*** Activities for creating interim statistics/financial overviews is often registered at code 26
  Solution: Searching for these types of activities in the description fields and removing them from the data set
- ***Problem 6:*** The activity of requesting and processing client information needed for the financial statements is often registered at the wrong code (often code 26).
  Solution: Searching for these types of activities in the description fields and including them in the data set by changing the working code to 21
- ***Problem 7:*** The activity of reviewing the financial statements by the responsible accountant is often registered at the wrong code (often code 61).
  Solution: Searching for these types of activities in the description fields and including them in the data set by changing the working code to 21
- ***Problem 8:*** Planning-activities are often registered at the wrong code (code 26 or 61)
  Solution: Searching for these types of activities in the description fields and including them in the data set by changing the working code to 21
- ***Problem 9:*** Activities by tax specialists (or sometimes also accountant) for creating the corporate income tax return are registered at the wrong code (39 and 79)
  Solution: Searching for these types of activities in the description fields and including them in the data set by changing the working code to 32
- ***Problem 10:*** Activities by secretaries for creating the hardcopy financial statements are registered at the wrong code (code 26)

Solution: Searching for these types of activities in the description fields and including them in the data set by changing the working code to 32

- ***Problem 11:*** Of some activities it could not be identified who the employee was which has carried out that activity

  Solution: These activities are summarized with one 'employee-type', namely unknown. The average known salary-level (of the earlier retrieved dataset for testing) of the unknown employees was calculated and used in the final analysis.

All of these problems had to be detected by the use of multiple different 'scripts'/formulas and the inclusion of correct data and the exclusion of incorrect data. Another more important difficulty with using the hour-registration as input for the analysis was that the use of the hour registration differed among many employees (inconsistent registration), thus limiting the analysis of the data.

Appendix 9. Data collection from the combined data set of the hour-registration and the monitoring database for data input

An obstacle that had to be overcome when the data from the hour-registration was combined with the data from the monitoring database is that the hour-registration was on a client group level, while the monitoring database was on a single company/component level. Therefore the data from the monitoring database had to be aggregated to the client group level, and the corresponding values were added or averaged where necessary.

For investigating the behaviour of the business process the dataset of the hour registration have been combined with the dataset from the monitoring database. This data can consequently be used to identify the factors (client group/component characteristics) that determines (mostly) the hours spent on an engagement. As a big problem in using the data (in comparison with each other) is because the uniqueness of clients determines the time necessary for the engagement. It is thought that mostly the size of the client determines the time necessary for the engagement. It is likely that the number of components within a client group is therefore a determining factor, but also the number of general ledger accounts (GLA) and the material value of the client can be a determining factor. The influence of these variables on the total time spent for an engagement can be researched using a correlation test and a regression analysis. But before these tests may be performed it is necessary to test if its preconditions are satisfied.

The concerning preconditions are that it should be a linear relationship and that the variables are bivariate normally distributed. It will be researched if these preconditions are met, by analysing scatter plots (of expected cumulative probability with observed cumulative probability and of standardized residual with standardized predicted value) for not showing points along the diagonal respectively show points without a pattern. Consequently Pearson's product-moment correlation can be calculated and this gives the following result:

Table 17: Pearson's Product Moment Correlation for Total Hours Spent on 21

		Amount of Dossiers	Avg. # GLA	Tot. hours 21
Amount of Dossiers	Pearson Correlation	1	,141*	,682**
	Sig. (1-tailed)		,033	,000
	N	171	171	171
Avg. # GLA	Pearson Correlation	,141*	1	,294**
	Sig. (1-tailed)	,033		,000
	N	171	171	171
Tot. hours 21	Pearson Correlation	,682**	,294**	1
	Sig. (1-tailed)	,000	,000	
	N	171	171	171

It shows that there is a reasonably strong relationship between the number of dossiers and the total hours spent on the engagement for compiling the financial statements. The variable representing the number of dossiers explains 47% of the variance of the total hours spent, which is (reasonably) high. There also seems to be a relationship between the (average) number of general ledger accounts and the total hours spent on the compilation of the financial statements, but this is a much less stronger relationship (explains only 9% of the variance).

Regarding the compilation of the tax return, a separate analysis has to be performed. Because firstly, the calculated hours spent on compiling the tax return are only for the corporate income tax return, the client groups with other types of tax returns have to be excluded from the analysis. Secondly, there is one variable missing in the current data-set, which is likely to be the determining factor. Namely, the amount of tax returns for a client group (which is not necessarily equal to the amount of components). Thus this variable is calculated and is also used in calculating Pearson's product-moment correlation.

Table 18: Pearson's Product Moment Correlation for Total Hours Spent on 32

		# Dossiers	Avg. # GLA	# Tax Returns	Tot. hours 32
# Dossiers	Pearson Correlation	1	,018	,713**	,234**
	Sig. (1-tailed)		,416	,000	,004
	N	135	135	135	128
Avg. # GLA	Pearson Correlation	,018	1	,068	,010
	Sig. (1-tailed)	,416		,216	,456
	N	135	135	135	128
# Tax Returns	Pearson Correlation	,713**	,068	1	,215**
	Sig. (1-tailed)	,000	,216		,007
	N	135	135	135	128
Tot. hours 32	Pearson Correlation	,234**	,010	,215**	1
	Sig. (1-tailed)	,004	,456	,007	
	N	128	128	128	128

**. Correlation is significant at the 0.01 level (1-tailed).

*. Correlation is significant at the 0.05 level (1-tailed).

From this analysis it appears that the amount of dossiers is determining the total hours spent on compiling the tax return (still only 5% explained variance) more than the total amount of tax returns for the dossiers. Besides, it appears that the difficulty of the client expressed in the amount of GLAs does not determine the hours spent on the tax return.

For both dependent variables (total hours spend on financial statements & tax return) there is a significant relationship with independent variables, thus the intermediate relations can be calculated using a regression analysis.

Regression Analysis – Financial statements

A regression model is consequently calculated for the financial statements. This resulted into a significant (F=85,86 ; Sig.<0,001) model with 50% explained variance for the total hours spent. It leads to the following regression formula (Sig.<0,01) :

*Total Hours Spent 21 = - 51,94 + 28,07 * Amount of Dossiers + 4,92 * Avg. Number of GLA*

The constant in this formula is equal to -51,94, this is logical because there is never a client group with 0 components. Moreover there is also never a client group with (on average) 0 GLA, resulting in the fact that there will (almost) never be a negative value. If we would imagine a small client (group) consisting out of 1 component with 8 GLAs it would lead to a total hours spent of approximately (-51,94 + 28,07*1 + 4,92*8 =) 15,49 hours. When compared to the original data with 3 separate

client groups containing 1 component and 8 GLAs it seems that this calculated value is indeed comparable (12,55 / 17,2 / 22,18).

Regression Analysis – Tax Returns

The regression model for the tax returns is not fulfilling its preconditions, thus cannot be calculated nor used. Besides, it only leads to a regression model with 6% explained variance.

Conclusions

For using the data for further analysis and comparison, the data for the financial statements can thus be normalized using the number of dossiers and the amount of GLAs. Also the total hours spent on the engagement for compiling the financial statements thus appears to be reasonably predictable on basis of the amount of components and GLA's. For normalizing the data of the tax returns, it can be normalized using the amount of tax returns for a client group.

Appendix 10. Challenges encountered with (using a simulation model for) applying BPM to the case study

This appendix describes the challenges encountered and relates with Table 10 in paragraph 7.2.

Data & Measurability Challenges

The challenges mentioned regarding data & measurability (specified in paragraph 4.2.3) and that were actually encountered in this research is the inadequate attention to measurement of process performance and the problems of data quality and integrity. The collection of data was only a partial problem, as retrieving the data from the separate hour-registration and monitoring database was no problem but combining them appeared to be reasonably difficult due to the different levels of measurement (one system is based on individual components, while the other system is based on client groups). Eventually the most detailed data was aggregated (/averaged) to correspond with the data stored on a higher level (the hour-registration).

Besides, measurement of the process performance indeed appears not to receive much attention by the case study company. When business experts were namely asked about the performance of different offices and/or employees, nobody could answer this question with a quantitative estimate. Only the performance of individuals is assessed on basis of a manager knowing the specific details of the process itself (client characteristics and the expected/desired productivity of the employee). Also no real data is stored about the quality of the eventually compiled financial statements and/or tax return, such that it is also not measured how high the quality of the created products is of different employees / offices. Again, this is performed within the case study company on basis of individual knowledge and involvement with the business process, but no results are stored of this assessment.

The biggest problem for analyzing the data to be used as input for the discrete-event based simulation was due to limited data quality (and especially regarding validity and consistency) for its intended use in the case study research. While retrieving and preparing the data from the hours-registration some problems were encountered (see also Appendix 8), it was concluded that the data was incomplete (sometimes missing information), invalid (often wrong/general codes), inconsistent (employees registered their hours in different ways) and not completely accurate (sometimes activities were registered as multiple tasks in the hour-registration, while in real-life it was carried out as one activity). Also, regarding completeness, a significant problem was formed by often not having the data in sufficient detail. It was presumed that the data could be used for retrieving process times of specific tasks & sub processes, but due to all before mentioned problems this use of the data was very limited. For instance, process times for sub process 2 and 3 could only be retrieved on basis of seeing it as one large activity. Interviews could not help to overcome this due to the problems of paragraphs 0 and 0.

Thus, data quality was limited for its intended use in the case study research, hampering the possibilities of using discrete event simulation to apply BPM methodology and the possibility for applying BPM itself. Besides, the lead-time could also not be calculated from the hour-registration as certain registered hours could be valid but a long time before (most often creating a planning) or after (most often archiving / finalizing) far away from the actual compilation, but still be valid hours for the total compilation. Therefore the lead-time resulting from the simulation model cannot be compared to data from reality for its validation.

Definition Challenges

As summarized by Hsieh et al. (2012) multiple authors have written about the definition challenges associated with service-based organizations. Firstly, in the case study research it also appeared to be very arduous to define how service-failures arise in the business process, i.e. what the sources of errors are and how to drive them down. This is mostly because of the high knowledge intensity that characterizes the business process. In the case study it appears that it is almost always necessary to make corrections after reviews have been performed. It is thus regarded as normal that assistant accountants make (slight) mistakes when compiling a financial statement, due to the high knowledge-intensity. Besides, the applicability of principle-based regulation like NV COS (4410) on a compilation engagement makes knowledge (slightly) subjective, resulting in the fact that it is not always easy to decide what is wrong or right. But, because this is corrected within the business process, it is also not (immediately) regarded as service failure. Secondly, if service failure would be defined from a customer perspective, it is questioned if customers have enough expertise to identify mistakes in the final financial statement / tax return (S., 2012c, Workshop, 2012). This is analogues to the discussion presented in paragraph 2.3 about customers of service-based organizations having difficulties with valuing the (technical) service quality.

Challenges due to Variability

As summarized by Hsieh et al. (2012) the variability in service processes are engendered due to the (preferences and characters of) employees carrying out the business process and the clients for which they are carried out. Both these possible causes of variability have also been encountered in this research. The arrangement and execution of the business process seemed to be highly dependent upon several factors, which are the following:

1. Client Size (/ Difficulty)
    a. Size/Difficulty of the client influenced if certain activities are carried out or not
    b. Size/Difficulty of the client influences the extent of involvement of a case manager, (senior) manager and/or responsible accountant
2. Client-specific Difficulty
    a. Some of the (mostly smaller) clients have a poor administration resulting into more work (for calculating the trial balance) or multiple requests (for new information) than when his administration was (more) correct
3. Client-specific priority
    a. Certain clients could be postponed (half-way) due to other high priority clients by mutual agreement
4. Office / Responsible Partner / Case Manager
    a. Some responsible partners had different ways of arranging work, for instance regarding
        i. The involvement of a case manager or not
        ii. The extent of the involvement of a case manager, (senior) manager and/or responsible accountant
        iii. The degree of collaboration between the two different departments in the business process
5. Case manager/ Employees
    a. Some case managers and employees have different ways of arranging work and different preferred ways of working, for instance
        i. Always using only Caseware and never Accountview
        ii. The use of a different threshold for deciding to work with Accountview
        iii. Always wanting/explicitly asking an electronic administration or not
        iv. The difference between sometimes or never carrying out a check of the received PBC-material

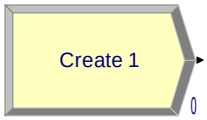
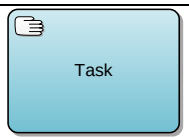
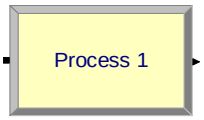
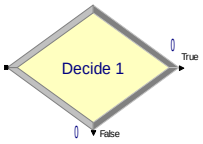
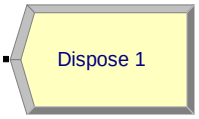
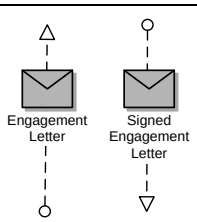
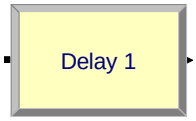
v. The threshold for deciding on the (extent of the) involvement of the case manager
vi. The choice for immediately starting the entire compilation of the trial balance or firstly creating the needed preliminary journal entries and consequently using the working program to work out the trial balance. This appears to be based upon preference and expertise of the employee.

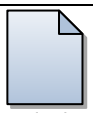
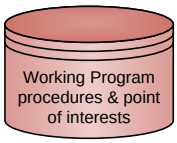
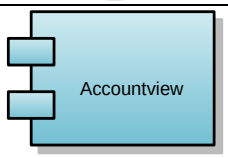
6. Time Pressure
    a. If time pressure exists it is sometimes decided to eliminate (or rearrange) a (intermediate) review/check

Appendix 11. Model Translation Rules

This appendix describes the rules followed for translating the model from the process models into a discrete event simulation model in Arena. It shows how each item of BPMN is represented in the simulation model.

Table 19: Table of BPMN Concepts and their Translation to Arena

BPMN Concept	Explanation	Arena Concept	Explanation
Swim lane	Swim lanes in BPMN represent an participant (/actor) in the process	Resource	Resources in Arena are the representation of resources that can be used in the process (thus also actors)
(Request for) Financial Statements & Tax Return	Shown with the BPMN concept of an information document, which are being processed (/created) by the process	Entity	Entities in Arena represent the products processed in the system which follow the sequence of the model
	Only the first start event of process model 1 is translated. The other start events are just for making it possible to represent the business model in multiple process models.		The Create-module supports the creation of the incoming requests (for Financial Statements and Tax Returns) of clients
	A sub process in BPMN is only used to allow a visual hierarchical representation of the models. Sub processes are thus not translated, only its underlying tasks	n.a.	n.a.
	A task being carried out by the corresponding actor		The Process- represents a tasks which is being carried out by a/multiple resource(s)
	Gateway for making choices or splits in the process		The Decide-module allows to split the process flow into multiple (exclusive) branches which are followed based upon a given chance or condition
	Only the last end event of process model 7 is translated. The other end events are just for making it possible to represent the business model in multiple process models.		The Dispose-module of Arena represents the disposition of requests which were handled and finished in the business process.
	Sending and receiving information to another actor (outside the organization) such as the client.		The Delay-module allows the representation of a delay caused by the act of sending and waiting (for the response) in the business process.

	Information Documents/ Concepts other than the Financial Statements & the Tax Return	n.a.	No translation is needed to Arena, because it does not represent the process structure, behavior or its entities.
	Database	n.a.	No translation is needed to Arena, because it does not represent process behavior.
	Application	n.a.	No translation is needed to Arena, because it does not represent process behavior.

Appendix 12. Comparison of Simulation Model Output with Process Performance in Reality

- Not in Public Version -

Appendix 13. Explaining & Discussing BPM Principles

In this appendix each of the (in chapter 4) mentioned principles is explained and discussed in a separate paragraph. But when principles are overlapping in their (intended) result or reasoning they are taken together for discussion in one paragraph. This appendix only describes the possibilities that are identified by applying the principle to the case study, not how they can (or should) be realized.

Principle 1 – Customer - Control Relocation

This principle prescribes to move controls towards the customer and was identified by Klein (1995). Different checks and controls that are now being carried out in the business process could possibly be moved towards the customer (Reijers and Mansar, 2005). An example is given by Klein (1995) of Pacific Bell that moved its billing controls towards its customer, which resulted in a elimination of a bulk of billing errors and also improved customer's satisfaction. A possible downside of this best practice is a higher probability of fraud by the customer. In the process of this case study multiple checks can be identified, namely:

1. In sub process 1 there is a check of the planning by the responsible accountant or case manager
2. In sub process 1 there is a check of the engagement letter by the responsible accountant and/or case manager
3. In sub process 1 there is a check of the received (non-) financial data and information
4. Sub process 3 almost completely consists out of checks of the financial administration and the created trial balance and financial statements
5. In sub process 5 there are checks by the case manager, responsible accountant, reviewing accountant and responsible tax specialist of the financial statements and the dossier
6. In sub process 7 there is a check by the responsible tax specialist of the tax return

The check of the planning (1) is impossible to relocate to the customer, because it is about company internal aspects of which the customer has no information. Besides, number 5 and 6 of the list above are checks of the internally created documents (financial statements and dossier), which require the expertise of the accountants and are therefore impossible to relocate towards the customer.

Checks 3 and 4 do can offer possibilities for relocation towards the customer. Check 3 is mostly aimed at deciding if all data and information has been received that was requested earlier, thus the completeness of the information. This is a check which does not require special expertise and can thus possibly be carried out by the client himself. Also the check of the financial administration contains some completeness and reconciliation checks, which could possibly be relocated towards the customer. This leads to the following process improvement possibilities:

I. Relocating the completeness and accuracy checks of the received (non-) financial data and information towards the customer
II. Relocating the completeness and reconciliation controls of financial administration towards the customer

Principle 2 – Customer – Contact Reduction

This principle prescribes to reduce the number of contacts with customers and third parties and is mentioned by Hammer and Champy (1993) and Buzacott (1996). Because these information exchanges with customers (and third parties) are often time-consuming, due to substantial wait times, these contacts should be reduced (Reijers and Mansar, 2005). Besides, each contact moment introduces the possibility of introducing an error. This best-practice also mentions that not every

information exchange has to be skipped, but some can be combined (with limited extra cost). A downside can be that essential information is missed, which can have a negative impact on the quality.

Third parties in the business process are scarce, as only the granting organizations in the end of the business process can be regarded as third parties. Reducing this contact is not possible, as it is the required and intended result of the business process. But, in contrast, multiple contact moments can be identified with the client, namely:

1. In sub process 1 there is (sometimes) a preliminary consultation with the client
2. In sub process 1 the client receives a request for the needed (non-) financial data and information and is asked to provide the company with this information
3. In sub process 1 the client is sent the engagement letter which he has to sign and sent back to the company
4. In sub process 3 sometimes it is found by the employee that information is missing. In this case the employee requests the client to provide the company with this missing information
5. In sub process 5 the concept financial statements are discussed. Firstly the concept financial statements are being sent towards the client. Then there can be a meeting with the client for this discussion, but it also happens that the concept financial statements are being sent towards the client. The client then has to respond with either an approval or a disapproval, which can be done by a telephone call, e-mail or post.
6. In sub process 6 the final financial statements are being sent towards the customer
7. In sub process 9 the client is sent the concept tax return, which he has to approve (or disapprove) by sending back his answer (almost always an approval and via post), which is sub process 10.

If contact moment 1 is being held, this is already (most often) combined with contact moment 2. In the case of a new customer contact moment 1 is also necessary. Contact moments 2 and 3 are also both necessary, but can possibly be combined. If contact moment 4 happens, it is also necessary and therefore cannot be eliminated. Contact moments 5 and 6 are also necessary and cannot be combined, due to the causal relationship between these two tasks together with the necessary intermediate tasks. Contact moment 7 is also necessary but could possibly be combined with contact moment 6 or either contact moment 5.

III. The contact moment for requesting the client for his (non-) financial data and information and his response be combined with the contact moment for sending and receiving the (approved) engagement letter
IV. The contact moment for sending/discussing the concept tax return to the client can possibly be combined with sending the final financial statements to the customer
    a. Or with sending/discussing the concept financial statements

But this principle also describes of trying to prevent possible unnecessary contact moments. Thus this means for the case study to try to prevent contact moment 4 from happening. Thus trying to change something in the process that makes sure contact moment 4 will not happen, or will happen marginally.

V. Prevent the necessity of requesting additional data and information during the compilation of the financial statements from happening

Principles 3 & 10 – Customer & Business Process Behavior – Integration & Parallelism

The integration best-practice (Klein, 1995, Peppard and Rowland, 1995) can be seen as exploiting the supply-chain concept of production and prescribes to integrate with a business process of a customer or supplier (Reijers and Mansar, 2005). It is claimed that, in general, integrated business processes are more efficient from a time and cost perspective. A potential drawback could be the growth of mutual dependency and therefore a decrease in flexibility.

The granting organizations (third parties) of the public accounting firm do not have business processes with which the business process of the accounting firm can integrate. Also the business process do not have real suppliers (only the client delivers his information) with whom could be possibly be integrated. When this best practice is taken to the extreme it could describe the embedded implementation approach of XBRL. In this case, XBRL is implemented in the systems/applications of the client and consequently linked with the systems of the case study company such that they always have the most recent data of the client's company at its disposal.

VI. Integrate with the internal financial accounting processes of the client's company, when existing (equal to XBRL embedded approach)

The parallelism best practice (Rupp and Russel, 1994, Buzacott, 1996, Berg and Pottjewijd, 1997, Aalst and Hee, 2002) and is simply prescribing to put tasks in parallel. This best-practice has been applied numerous times within business process redesign. It is claimed that often business processes are ordered sequentially without logical restrictions prescribing this order. Thus by putting these tasks in parallel decreased lead-time can be achieved (Reijers and Mansar, 2005). A down-side of this approach is that the efficiency may decrease (in case of business processes with possible knock-outs) and that managing the business process becomes more complex, which can possibly decrease quality. Almost all tasks are having a causal dependence (logical restrictions for a prescribed order) and therefore the parallelism does not immediately lead to a possible process improvement.

But when viewing the departments within the business process as different actors, the 'aangiftepraktijk' can also be regarded as the customer of the 'samenstelpraktijk' and vice versa (the supplier). In the processes of the 'samenstelpraktijk' there is one review of the concept financial statements and dossier by a tax specialist. But only after the financial statements are finalized, the 'aangiftepraktijk' obtains the final financial statements which they use for compiling the tax return. If we would take the departments as different actors the integration principle can be applied, which then prescribes to integrate the business processes. This would then also be an implementation of parallelism because there is an company-internal integration. It means that the compilation of the tax returns is not performed after the financial statements are finished, but during the compilation of the financial statements. This leads to the following process improvement possibility:

VII. Integrate the process of compiling the financial statements with the process of compiling the tax return and let them run in parallel.

Principle 4 – Business Process Operation – Order Types

The order types best-practice (Berg and Pottjewijd, 1997, Hammer and Champy, 1993, Rupp and Russel, 1994, Peppard and Rowland, 1995) prescribes to identify (if present) different order types and to determine if tasks in the process are related with the same or with different order types (Reijers and Mansar, 2005). Consequently it has to be decided if a new business process should be distinguished/designed for a different order type. It is claimed that non-specific parts are often less effectively managed resulting in a lower efficiency. But a downside of this best-practice could be an increase in coordination efforts between the different business processes, possibly resulting in decreased quality and increased lead time.

As is explained in paragraph 2.3, business processes of service organizations are (often highly) customizable towards the customer, meaning that no business process is exactly the same. Therefore it is also hard to identify parts of the process which are not specific to the whole business process. At least, the sub processes 1 and 4-9 are being carried out (mostly) in the same way. Sub process 2 is dependent upon the input type being supplied by the customer, but is still specific to the whole business process and no real sub flow can be identified. The exact contents of sub process 3.1 are highly dependent upon customer characteristics, such as the parameters (branch, legal form, typology, reporting framework, tax return type, etc.) and the complexity and size of the company. But this part of the process is customized towards these parameters and characteristics by which all parts of this sub process are definitely specific for the business process they are part of. Also, no real sub flow of activities can be identified. This best-practice therefore seems not applicable to the case study.

Principle 5 – Business Process Operation – Task Elimination

This best-practice is mentioned by multiple authors (among others Peppard and Rowland (1995), Berg and Pottjewijd (1997), Aalst and Hee (2002) and Buzacott (1996)) and prescribes to eliminate unnecessary tasks from a business process. A common way for implementing this is regarding tasks as unnecessary when a task adds no value from a customer's point of view. For instance control tasks often do not do this, because they are incorporated to fix problems created (or not elevated) in earlier parts of the process (Reijers and Mansar, 2005). But the best-practice itself does not explain further types of tasks which could be eliminated or principles for identifying them. Principle 33, regarding Lean Manufacturing, is much more specific in defining which tasks are unnecessary, therefore this best-practice will be discussed in the concerning paragraph further down below.

Principle 6 – Business Process Operation – Order-based work

This best-practice is identified by Reijers and Mansar (2005) themselves and prescribes to remove batch-processing and periodic activities from a business process. It is claimed that piling up in batches and periodic activities are disturbances in handling a single order, and that the lead time significantly decreases when these two disturbances are eliminated.

In some business processes of the case study periodical acitivities can be identified, like the administration-week in the end of each quarter. But these business processes are not within the scope of this research. In the business process of compiling and submitting financial statements and tax returns no periodical nor batch activities could be identified. Therefore this best-practice does not seem to be appicable to the case study.

Principles 7 & 8 – Business Process Operation – Triage & Task Composition

These best-practices are related and therefore discussed in the same paragraph. Both best-practices are aimed at dividing tasks into multiple tasks or the opposite to combine different tasks into one task. Only the reasoning behind these best-practices seems to be different.

The triage best-practice has, among others, its origin in Klein (1995). This best-practice is being described as to consider the division of a general task into two or more alternative tasks or, the opposite, to consider the integration of two or more alternative tasks into one general task (Reijers and Mansar, 2005). The claim is that it is possible to divide general tasks into smaller alternative tasks (or similar tasks for different order characteristics) which can then be appropriated to different resources for performing the smaller tasks. The benefit is claimed to be in the fact that tasks can then be appropriated to resources which have better capabilities for these specific tasks (possibly depending upon the order characteristics). This should improve the quality of the work and can increase productivity (/efficiency) and it is also claimed that it facilitates a better utilization of resources, with obvious costs and time advantages (Reijers and Mansar, 2005). The task composition

best-practice also prescribes to divide large tasks into workable smaller tasks. The reasoning is that large tasks may result in smaller run-time flexibility and lower quality because the tasks become unworkable. Therefore dividing large tasks would (again) increase quality, but also increase run-time flexibility.

But, possible downside of these best-practices is that multiple hand-offs are needed at different moments in time between different participants of the process causing an increased lead time by the inter-task handoff delays (Dewan et al., 2000). Therefore the opposite best-practice (of triage) is to integrate two or more alternative (or similar) taks into one general task and the opposite of task composition prescribes to combine small tasks into composite tasks. Another reason for this best-practices is that multiple small tasks require multiple setup times, i.e. the time spent by a resource to become familiar with the specifics of an order (Reijers and Mansar, 2005). Therefore it is claimed that this integrating/combining multiple tasks into one general/composite task would have a positive impact on the productivity (/efficiency).

When applying the first form (dividing tasks) of these principles to the case study large/general tasks should be identified. A large task that can be identified is the compilation of the trial balance and assessing its sufficiency (sub process 2 & 3) which are (mostly) being carried out by one employee for one company (/component) as if one task. Besides this task, no (real) large or general tasks can be identified. But this will lead to the following improvement possibillity:

VIII. Divide the compilation of the trial balance into multiple smaller tasks and appropriate them to the correct resources

Then there is still the second form (integrating/combining tasks) of these principles for which small/alternative tasks have to be identified in the business process of the case study. Small tasks can be found in the beginning of the process (sub process 1) and in the end of the process (sub process 5), but only in the tasks in sub process 1 could possibly be combined. The tasks in sub process 5 are namely set-up such that they have to be performed by different employees (the internally obliged reviews). Others have a causal relationship with intermediate tasks/delays (such as correcting after the review, sending the documents to the client, receiving its answer and/or discussing the documents) and can therefore not be combined. Thus only the different tasks in sub process 1 would offer possibillities for improvement.

IX. Combine (some of) the different tasks in the planning & preparation phase into one composite/general task

Principle 9 – Business Process Behavior – Resequencing

The resequencing best-practice is identified by Klein (1995). It is claimed that in business processes actual task orderings are not (always) reflecting necessary dependencies between tasks. Therefore it is claimed that it is sometimes better to postpone a task if it is not required for immediately following tasks, because it may appear that its execution may prove to become superfluous which saves cost and time. It could also be that tasks are moved into the proximity of a similar task, by which setup times are minimized (Reijers and Mansar, 2005).

For applying this principle to the case study it should be identified if tasks are being carried out which are not required for immediately following tasks. When the business process is studied it can be seen that the activities in sub processes 2-10 actually all have a causal dependence and can therefore not be resequenced. Sub process 1 exists out of some tasks which not necessarily have a causal dependence but are always necessary, thus an acitivity can never appear to be superfluous. The other possibillity was to move a task into the proximity of a similar task for diminishing setup times. If

this would be applied to sub process 1 it would lead to the same improvement possibillity (IX) as explained at principle 8.

Principle 11 – Business Process Behavior – Knock-out

The knock-out best-practice is researched intensively by Aalst (2001) and is prescribing to order knock-outs in an increasing effort and in a decreasing order of termination probability. A knock-out process is a workflow process with a specific structure with the goal to decide whether the case should be accepted or rejected. And for making this decision multiple tasks are needed to be executed (Aalst, 2001). Thus various conditions are checked and if they are not satisfied it will lead to the termination (of that part) of the business process. And when the different knock-out checks are arranged in order of increasing effort and decreasing termination probability is will lead the least costly business process execution. The only possible disadvantage of this best-practice is the increase of lead time, compared to the situation where all knock-out checks are performed in parallel.

When studying the case study no real knock-outs can be identified. Only, outside of the scope of this research, the real decision for accepting a client by the responsible accountant in the entire beginning (during acquisition) can be regarded as a real knock-out. Strictly speaking, task 3.1.1. is the test for the acceptance (or continuing) of an engagement, but this actually never leads to a knock-out. This is because the corresponding procedure is already taken into account when the responsible accountant decided to accept the engagement. Therefore this best-practice does not lead to any possible improvements.

Principles 12 & 21– Business Process Behavior & Organization Population – Exception & Specialists-Generalists

This best-practice was identified by Hammer and Champy (1993) and prescribes to design business processes for typical orders and to isolate exceptional orders from normal flow. The idea is that exceptions seriously disturb normal operations and therefore should be isolated. They can then be handled by a (set of) specific resource(s) which can build up expertise with the exception and can thereby increase the quality and efficiency of the handling of the exception and also the lead time will be improved (Reijers and Mansar, 2005). Isolating the exceptions will also prevent unknowledgeable employees to waste time on these exceptions which they cannot handle/resolve.

For applying this principle to the case study it should be investigated if exceptions can be identified. When looking at client characteristics all clients are unique and when looking at the parameters of the different clients there is no single parameter which can be regarded as a real exception. But some exceptions can be identified in the financial status of the client. Sometimes the client's financial situation is negative, possibly resulting in a bankruptcy, or at least a threat of continuity. Or it can be that the client dit not provided the accountant with all information (or provided them with wrong/misleading information), leading to the abstention of a judgment or a negative judgment. Possibly these types of orders can be isolated from the normal flow.
But simulataneously, because it is prescribed to let the exception be handled by a (set of) specific resources which can build up expertise with the exception, it can simultaneously be regarded as an implementation of principle 21, namely the specialist-generalist best-pracitce (also discuccsed further below) Bot these principles lead to the following process improvement possibilllity:

X. Isolate the clients with a negative financial situation for separate handling

Principles 13, 16 & 19 – Organization Structure – Order Assignment, Split Responsibilities & Numerical Involvement

These principles are grouped together for discussion in one paragraph as I'm in the opinion that these best-practices have overlapping areas in their (intended) process improvements and therefore also have a similar impact.

Firstly, the numerical involvement best-practice (Hammer and Champy, 1993, Rupp and Russel, 1994, Berg and Pottjewijd, 1997) prescribes to minimize the number of departments, groups and persons which are involved in a business process. The claim is that when fewer people, departments and/or groups are involved with the business process it would lead to less time spent on coordination efforts, and therefore the efficiency can increase (Reijers and Mansar, 2005).

Secondly, the order-assignment best-practice prescribes to let workers perform as many steps as possible for single orders. When taken this to the extreme it would mean that one employee would carry out all tasks for a single order, resulting in the employee getting acquainted with the case and therefore setup times will be decreased, increasing efficiency (Reijers and Mansar, 2005). Also because the employee is more knowledgeable of the case, the quality is likely to be increased. Downside of this best-practice could be that the flexibility of the resources is reduced and that the lead time may increase because of the waiting times for the resource to be available.

While Reijers and Mansar (2005) mention these both as separate best-practices, I'm in the opinion that these best-practices prescribe the same result. This is because implementing the order-assignment best-practice would also imply a reduction in the number of employees (thus the numerical involvement). Therefore it is remarkable that Reijers and Mansar (2005) do not mention that the order-assignment best-practice can also possilbly lead to lesser coordination times (and thus an increased efficiency) as with the numerical involvement best-practice. Also the numerical involvement best-practice could lead to workers getting more acquainted with the case, because employees are carrying out more tasks for a case, and thereby increasing quality and efficiency (even more), but is likely to increase lead-time.

Also the split responsibilities best-practice is, like the numerical involvement, aimed at reducing the coordination times. The split responsibilities best-practice is mentioned by Berg and Pottjewijd (1997) and Rupp and Russel (1994) and prescribes not to assign task responsibilities to people from different functional units. Besides an increase in efficiency is expected due to less time needed for coordination, an increase in quality could also be expected. This is because tasks for which different departments share responsibilities are more likely to be a source of neglect and conflict and therefore lesser quality than when responsibilities are split (Reijers and Mansar, 2005). A possible disadvantage of this best-practice is that, equal to the order assignment best-practice, the effective numbers of resources are reduced, which causes lead-time to increase.

When applying these principles to the case study it is firstly important to mention that for the case study company (and the whole sector of accounting firms)) it is standard practice that a team of employees is assigned to a case. For the case study it means that actually always one assistant accountant is working on the financial statements for one company and that only if a client group consists out of multiple complicated components multiple assistant accountants are assigned to the engagement, but also to different components. Therefore the order-assignment best-practice and the numerical involvement best practice (regarding people/groups) is already (almost) always applied and therefore does not lead to a further process improvement.

Regarding the numerical involvement (for different departments) and the split responsibilities best-practice it should be checked where in the business process multiple departments are involved and if multiple departments share the responsibility for a single task. In the business process no single task can be recognized that has the shared responsibility of different departments. Therefore the split responsibilities best-practice does not lead to any possible process improvements. But the

involvement of multiple departments in the business process (a shared responsibility for the delivered service) can be recognized in the involvement of the tax specialists with the creation of the (fiscal position within) the financial statements. This involvement is (mostly) only a review of the responsible tax specialist in sub process 5 of the financial statements. The numerical involvement best practice would thus lead to the following possible process improvement (which is a specification of XXVII):

XI. Let the review of the tax position by the responsible tax specialist be either performed by someone of the accountancy department or eliminate this review

Principles 14 & 21 – Organization Structure & Organization Population – Flexible Assignment & Specialists-Generalists

This best-practice is identified by Aalst and Hee (2002) and prescribes to assign resources in such a way that maximal flexibility is preserved for the near future. Thus if an employee assignment choice can be made between different types of employees, the (for that task) most specialized resource has to be chosen. This means that for a following task the possibility of having a free employee able to carry out that task is maximal (Reijers and Mansar, 2005). The advantage is that work does not have to be queued for waiting on the specific resource to become available, thus decreasing lead time. Also it would mean that the resources with the highest specialization is carrying out most of the work, by which quality is likely to increase. A disadvantage is that work-load maybe very unbalanced which can also lead to less job satisfaction.

When applying this principle to the case study it can be immediately identified that the best-practice is based upon a distinction between specialist and generalist employees. Therefore, applying this best-practice to the case study seems very unlikely as in the case study no real distinction can be made between specialists or generalists. Because the business process is arranged following the order assignment best-practice, the creation of specialists is almost nihil. Therefore, before this best-practice can be applied, the appropriation of resources have to be arranged such that specialists and generalists can be created and the order assignment practice has to be abandoned. The possibillity of creating specialists and generalists is discussed below. But under the precondition that specialists and generalists exists, the following possibillity for improvement exists:

XII. Assign the most specialized resources (when available) to the corresponding tasks

Multiple authors have investigated the specialist – generalist best-practice (Poyssick and Hannaford, 1996, Berg and Pottjewijd, 1997, Rupp and Russel, 1994, Seidmann and Sundararajan, 1997) which prescribes to maintain/hire the adequate specialist – generalist ratio. A specialist is an employee who is assigned to a small number of tasks such that he can quickly build up routine and expertise and can build up more profound knowledge, while a generalist can perform a multitude of tasks. The advantage of having specialists is that they work more quicker (increasing efficiency) and, because of their higher expertise, deliver higher quality, but the availability of generalists offer more flexibility to the case study company in assigning resources to tasks (Reijers and Mansar, 2005). Also this best-practice makes it possible to implement the flexible assignment best-practice and is therefore possible to decrease lead-time.

When applying this principle to the case study it is important to mention that the specialist-generalist best-practice assumes that there are multiple tasks with different characteristics which can consequently be assigned to multiple resources (with different types of expertise). The compilation of the tax return can be regarded as consisting out of one large activity which is not able to split into multiple tasks. Therefore this principle does not work with the compilation of the tax return. But with the compilation of the tax return some different sub processes can be identified, namely:

1. Activities in the planning & preparation phase (sub process 1)
2. Activities for compiling the trial balance (sub process 2 & 3)
3. Activities for making the concept financial statements (sub process 4)
4. Activities for correcting the financial statements (sub process 5)
5. Activities for making the financial statements definitive (sub process 6)

It is possible to assign resources for multiple engagements to one of these sub processes, making them specialized in one of these sub processes/tasks. Not taken into account the likely impact of this measure, it is still leading to the following process improvement possibility:

XIII. Assign resources to the activities of one (or multiple) sub process and not to the engagement, by which specialists and generalists can be created.

Besides the possibility of specializing resources according to different tasks in the business process another specialization possibility also exists. The clients are namely part of different lines of industry (by which also mostly a different working program is created), meaning that it could be possible to specialize resources according to one or few lines of industry:

XIII a). Assign resources to engagements of one (or few) lines of industry

Principles 15 & 29 – Organization Structure & Technology – Centralization & Integral Technology

These best-practices are taken together in one paragraph as the centralization principle is a special form (specification) of the integral technology principle.

The centralization best-practice has its origin in Aalst and Hee (2002) and prescribes to treat geographically dispersed resources as if they are centralized. Mostly this is/can be done by exploiting the benefits of a Workflow Management System (WfMS) as it takes care of assigning work to resources by which it becomes less relevant where these resources are located geographically (Reijers and Mansar, 2005). This best-practice is a special form of the integral technology best-practice, which prescribes to elevate physical constraints in the business process by applying new (available or self-developed) technologies (Peppard and Rowland, 1995, Berg and Pottjewijd, 1997, Aalst and Hee, 2002).

The specific advantage of centralization is that resources can be allocated more flexible, which makes it possible to better utilize employees (efficiency of the organization/not the business process) and likely also causes a decreased lead time (Reijers and Mansar, 2005). Both the best-practices can lead to less need for coordination or logistical tasks (improved efficiency and lead-time) and better availability of information to all resources leading to possible increase of quality. Both the best-practices have the only downside that the purchase and/or development of these systems can be very costly (like the automation principle).

Firstly, when applying this principle to the case study it is firstly important to mention that they are already being applied (to a certain extent). The by the case study self-developed compilation software (BEAT-S) can be partly recognized as a Worfklow Management System, because it creates a working program for the employee to carry out but it also makes the geographic location of involved employees unimportant (centralization). Secondly, BEAT-S is also a digital file application which makes it possible to store documents (/dossier information) digitally, such that multiple can acces it from different locations. Again it should be noted here, that not always these digital file is used for digitally storing documents, but that only a hardcopy document is available. It is also already noted that sometimes this makes it necessary for employees to spent time on searching for hardcopy documents (V., 2012). Therefore the following proces improvement possibillity exists:

XIV. Make sure that all documents are electronically archived such that employees do not have to spent time on searching for hardcopy documents

Secondly, when applying this principle to the case study it should be researched whether there are any physical constraints limiting the business process. Due to the intangible nature (information processing) of the business process, the physical constraints are immediately less than in a business process with tangible products. This can be identified in the case study company and therefore these principles do not lead to any possible process improvements.

Principles 13, 17 & 18 – Organization Structure – Order Assignment, Customer Teams & Case Manager

These best-practices are originally mentioned by Peppard and Rowland (1995), Hammer and Champy (1993), Berg and Pottjewijd (1997), Aalst and Hee (2002) and Buzacott (1996). The order-assignment best-practice (also already discussed together with principles 16 and 19) prescribe to select that employee to work on a certain task who has already worked on the same order before. The customer teams principle prescribes to (as a relaxation of the order assignment best practice) assign teams out of different departmental workers to customer orders (in this case engagements) which will take care of the entire processing of the engagement (Reijers and Mansar, 2005). It has possible advantages and disadvantages equal to the order assignment best-practice (increased productivity and quality, but possible increase in lead-time). But working in teams also has a possible additional benefit, which is an increase in the attractiveness (employee satisfaction) and understanding (quality) of work (Reijers and Mansar, 2005).

Besides assigning a team to a customer order, it is possible to assign a case manager to the order that's responsible for the processing of the engagement. With this best-practice the assignment of employees is not aimed at the execution of the work (as is with the customer teams best-practice) but at managing the execution. This best-practice is mostly aimed at improving the external quality of the business process (increasing customer satisfaction) and possibly also to improve the internal quality, as the case manager his responsibility is to make sure that all mistakes are corrected.

These best-practices are grouped into one paragraph for two reasons. Firstly, both best-practices are using the same principle to assign specific resources to an order. But more importantly is that both best-practices are part of standard procedures within the case study company. Also these are standard procedures within the entire sector of accounting firms. Therefore these best-practices do not lead to any possible process improvements.

Principle 20 – Organization Population – Extra Resources

This best-practice is quite straightforward as it simply prescribes to increase the number of resources in the case that capacity is not sufficient. Naturally, this best-practice is not aimed at increasing efficiency, but can be aimed at increasing lead-time (as more resources are available) and it can decrease the work-pressure of employees and thereby increase quality and employee satisfaction. But the principal aim of improving the business process of the case study is to increase efficiency; therefore this best-practice is decided to be outside the scope of this research and will thus not be applied to the case study company.

Principle 22 – Organization Population – Empower

This best practice is being mentioned by multiple authors (among others by Hammer and Champy (1993), Rupp and Russel (1994), Seidmann and Sundararajan (1997), Poyssick and Hannaford (1996) and Buzacott (1996)) and prescribes to give the employees most of the decision-making authority and thereby making it possible to reduce middle-management. In the traditional business processes it is claimed that a lot of time is spent on authorizations of work (which is performed by others) by

middle-management, making the process much slower (increase in lead-time) and more costly (decreasing efficiency). A likely drawback is that the quality of the process decreases, as middle-management is mostly assigned with guarding the quality of the process and making sure that mistakes are corrected (Reijers and Mansar, 2005). Also it is possible that eliminating middle-management causes employees to make many mistakes, which consequently needs a lot of rework, resulting in a more costly process with increased lead time and thus having the opposite effect.

The middle-management that can be recognized in the case study is the case manager. Thus the process improvement resulting from applying this principle is the elimination of the case manager best-practice and thus reducing the possible advantages of that best-practice.

XV. Remove the involvement of the case manager with the business process and empower the assistant accountants to have the decision authority of all tasks until sub process 5.1.

Principle 23 – Organization Population – TOC - Replenishment (for Services)

The replenishment application is the standard application for distribution (parts of) organizations. It prescribes to pull inventory to the supply chain and not to push inventory as conventional wisdom prescribes (Ricketts, 2011). The services sector (and specifically an accounting firm) does not have inventory. The Replenishment for Services application is therefore aimed at the human capital of a service organization, thus prescribes how to arrange resource management. Traditional hire policies are based upon hire-to-plan (requires a forecast, which are often notoriously inaccurate) or hire-to-deal (managers rushing to acquire capable resources in time to launch a project on demand) (Ricketts, 2011). The replenishment for services application uses a hire-to-buffer principle, which says to determine the right number of resources (of different types) and hire these to be ready to deliver services on demand for clients. These resources can get training or work in internal projects and will be used for client orders when requested., and consequently this buffer of resources should be replenished (Ricketts, 2011).

In the case study company it is important to recognize that the company cannot be fully considered as a service organization as mentioned by Ricketts (2011). This is because the client requests are (mostly) not sudden and unexpected. This is because firstly, a large part of the clients being served in the (business processes of the) case study company are clients who were already client the year before. Secondly, the company can (for the largest part) decide when to actuate a customer when enough capacity is available. Thus requests can be managed, by which it is not unexpected and forecasts can be quite accurately made. Thirdly, the financial statements which are created with the business process are subject to deadlines set by (the government in) rules and regulation, this makes it possible to make quite accurate forecasts. Also these deadlines can be managed, as the accounting firm can request (quite easily) for suspension of this obligation by which the requests can be spread out over time and thus also managed.

Due to this big influence the company has on the ‘arrival’ of client requests the problem sketched by Ricketts (2011) cannot be identified at the case study company and therefore does not lead to any possible process improvements.

Principle 24 – Organization Population – TOC – Drum-Buffer-Rope (for Services)

Within a production environment there is often a constraint which determines the pace of the business process, which is called the drum. The buffer is all work/tasks that is/are ahead of this constraint. The Drum-Buffer-Rope application is then the standard application for production where the buffer in the process is managed to fully utilize the constraint but not overloading it (Ricketts, 2011).This correct size of the buffer is managed by using ropes, this is an information system that connects the constraint with the entry and exit-points. The entry-point connection of this rope can

then be used to manage the buffer to fully utilize (but not overload) the constraint and the exit-point connection determines the priority of work of the constraint, ensuring on-time delivery of the good (Ricketts, 2011).

When applying this application to services the buffer management is replaced by capacity management. The drum is still the constraint, a rope is still connected between the drum and the exit-point (in this case the SLA with the client), but here the drum is connected by a rope with the capacity management function (not the entry-point). This capacity management then determines the right level of capacity, possible increase or decrease in capacity, needed to achieve the SLAs (Ricketts, 2011).

It is important to mention that it should still be investigated where the constraint is in the business process. It could be that the constraint is currently flowing around in the business process. But more likely the case manager, the responsible account, the reviewing accountant or the responsible tax specialist is the constraint in the process.

Assuming there is an identifiable constraint the business process, consequently a capacity management function should be implemented which is up-to-date about the work-load that the responsible/reviewing accountant has and also the agreements that are made with the client. He then has to arrange work such that the responsible accountant always has work to do, but that he is not overloaded with work such that the work-in-progress level becomes too high. This thus leads to the following possible process improvement:

XVI. Appoint someone to manage the capacity of the assistant accountants (and case managers) in such a way that the constraint is fully utilized in his available time, but not get overloaded with work, and that the SLAs are met.

But also the traditional Drum-Buffer-Rope application can be applicable to the case study, as the financial statements are the work in progress, which can be physically buffered before the responsible (/reviewing) accountant with an optimal quantity using the entry- and exit-points ropes. This thus leads to the following possible process improvement:

XVII. Determine the adequate size of the buffer for the constraint and manage the actuation of clients such that this buffer is always at a sufficient level.

For researching these principles it should thus be researched if a constraint can be identified.

Principle 25 – Organization Population – TOC Principles

The before mentioned applications of the theory of constraints are largely based upon several principles, which also guide the TOC thinking process. At least, they guide the investigations of cause-and-effect and also the solutions to the core problems. Beneath this paragraph these principles are shortly explained for their application to the case study company.

The weakest link principle is the central idea of TOC. The weakest link in the chain is the constraint in the chain which determines the production capacity of the whole system. This weakest link should consequently be managed and its capacity can be increased to increase the performance of the whole system. But the constraint should then be clear and capacity of the system should not be balanced, because this makes the constraint to flow around the system, because of which it is unclear where the constraint is (Ricketts, 2011). If the responsible accountant / reviewing accountant is the constraint, then the following process improvement possibility exists:

XVIII. Appoint an additional employee with the same responsibility as the responsible accountant (responsible of the dossiers and clients). OR Create more time in the agenda of the responsible accountant for reviewing (and signing) dossiers.

The pull principle of TOC is prescribing to pull orders trough the system (based on requests and the capacity of the constraint) and not to push orders trough production (Ricketts, 2011). The case study company is partly based upon the pull-principle, because they make orders based upon client requests. But, as explained earlier, the case managers actuate clients when the capacity (of himself and the assistant accountants) is sufficient. Only he does not base his decision upon the capacity of the responsible accountant, who is likely to be the constraint. But the possible improvement to take into account the capacity (and workload) of the constraint in the decision to pull the order trough the system is similar as process improvement possibillity XVII.

The optimization principle is based upon the weakest-link principle. It prescribes that local optimizations (to non-constraints) do not improve the performance of the entire system, as the constraint is still determining the performance of the entire system (Ricketts, 2011). Therefore it can be that non-constraints are not fully utilized, but global optimization is achieved (with the current constraint). This is merely a principle forming the thinking process of TOC and is not specifying (/does not lead to) a possible process improvement. Because it is, in contrast, specifying what should not be done.

The aggregation principle merely describes that the more things are aggregated, the less variable they become, making forecasts notoriously inaccurate (Ricketts, 2011). Thus it therefore prescribes not to push orders through the system. Also this principle does not lead to clear process improvement possibilities.

The core problem principle describes that there is usually one problem that is the root cause of many undesirable effects, thus therefore TOC prescribes to focus your attention to this root cause. This is contrast to conventional wisdom, which (often) prescribed to treat every problem which is encountered (Ricketts, 2011). But also this principle does not lead to any concrete and clear possibility for process improvement.

Lastly, the policy constraint principle is based upon the fact that policy constraints (such as the rule in the case study company that another accountant has to review the financial statements) are harder to resolve, than capacity/physical constraints (for instance how much time a reviewing accountant is available). This is due to the involvement of multiple managers when the policy has to be changed, in contrast to the (probably only one) single manager who should be spared of useless work or who should be newly hired. This is thus a principle that can guide the exact implementation of elevating the constraint, as explained in XVIII. It therefore does not lead to any new process improvement possibility.

Principle 26 – Information – Control Addition

This best practice is mentioned by Hammer and Champy (1993), Poyssick and Hannaford (1996) and Buzacott (1996) and prescribes to check the completeness and correctness of incoming materials and also to check the output before it is send to the customers. It is principal contribution is that it is likely to improve the quality of the business process. This consequently leads to an additional task (and thus initial resource allocation and time), but can also lead to less required rework (and thus an increased efficiency) (Reijers and Mansar, 2005). This best-practice is therefore the opposite of the task-elimination best-practice and lean, as those prescribed to eliminate bureaucratic work and controls.

When this principle is applied to the case study it should be checked where the moments of incoming and outgoing materials can be identified in the business process. Firstly, in sub process 1 is a task where data and information is requested from the client. When this information is received, it is sometimes checked by the assistant for its completeness and correctness, but not always. In both cases it can still be that in sub process 2&3 it appears that information is missing and new information has to be requested from the client, or even later on in the process during sub process 5 this sometimes appears to be the case. That this leads to (much) rework was also already explained with principle 6. Therefore this principle can certainly lead to a new process improvement possibility, which is actually a more specific implementation to achieve improvement possibility XXVIII, namely:

XIX. Always perform a (more) intensive check on the received data and information in sub process 1.

Regarding outgoing materials, in sub process 5 and 9 respectively the concept financial statements and the concept tax return are being sent to the customer. Regarding the tax return, (actually) always the tax return is reviewed by the responsible tax specialist before being sent to the customer, thus here the best-practice is already prescribed. Regarding the concept financial statements it can be recognized that the case manager (and responsible accountant) always checks the concept before it is send to the customer. But not always the reviewing accountant and tax specialist have checked the concept before it is send to the client, sometimes is is send after the concept have been sent. Therefore (in contrast to earlier mentioned principles) a possible process improvement possibillity can be:

XX. Always let the case manager, the responsible accountant, reviewing accountant and tax specialist review the concept financial statements before it is send to the customer.

Principle 27 – Information – Buffering

The buffering best-practice is identified by Reijers and Mansar (2005) their own case study work. It prescribes to buffer information by subscribing to updates in stead of requesting it from an external source. They claim that requesting information always costs a lot of time, causing the lead time to increase in a high degree. Therefore if you buffer the information, you have information directly available when it is required which causes lead time to decrease significantly.

When this principle is applied to the case study it is important to refer to principle 3 (Integration), which prescribed to integrate with the client's business processes. This means that information is up-to-date every moment in time. This buffering best-practice is therefore a weaker form of this principle (also recognized by Reijers and Mansar (2005)), because information is requested on a periodic but not continuous basis and a copy is maintained of the information with no direct acces to the original information. Moreover the request would also (by definition) be more frequent then the 'normal request' would happen. The 'normal' request for information is on a yearly basis when the client is actuated for the compilation of the financial statements and the tax return (task in sub process 1). Therefore, this best-practice leads to the following process improvement possibillity:

XXI. Request the needed information & data for the financial statements and the tax return on a more frequent basis

Principle 28 – Technology – Task Automation

Task automation is a straight-forward and often used best-practice for automating tasks which were formerly manual tasks and is specifically mentioned by (among others) Hammer and Champy (1993), Peppard and Rowland (1995) and Berg and Pottjewijd (1997). The most obvious (and positive) impact on the business process is that tasks can be carried out quicker and requires less human resources,

thus an increase in efficiency (not taken into account the costs of development for automation) and lead-time can be expected.

Besides the costs of development, another possible disadvantage, also mentioned by Reijers and Mansar (2005), is that a machine is often less capable of handling variations in comparison with human recources. And because the business process is dependend on the client characteristics and accounting firms have to deal with a high degree of customization this appears to be a likely downside. But still there are possibillities for automating tasks that are client-independent (fof instance the completeness checks of the financial administration). Secondly, as Reijers and Mansar (2005) also mention, but what is more elaborately explained by Braunwarth et al. (2010), is that this can be intercepted with a partially automated task. Braunwarth et al. (2010) explain that there are multiple degrees of automation possible between the two extremes: automated systems with operations performed by machines and non-automated systems with fully manual operation. For instance an automated task can determine the tasks to be performed manually (or the other way around) or an automated system can create indicators/flags and calculate ratios to quickly show the employees the most important information upon which the employee can base his decisions and consequent tasks.

When this principle is applied to the case study it should be immediately mentioned that, because of the inclusion of the employee satisfaction & knowledge-development indicator. a likely additional impact can be expected. Namely the more tasks are automated, the possibly less satisfied employees become (seeing that they might loose their job or loose interesting tasks) and also less development of knowledge (because the automated tasks were challenging and appropriate for training new employees). Also when applying this principle to the case study it is firstly important to mention that several different (degrees of) automated systems are already incorporated in the business process, which are:

1) Import of electronic administrations into Accountview and/or CaseWare
    a) Possibly Auditfile or Software Supplier-specific administration file
2) Automatic export/import of financial information in the business process:
    a) From Accountview to CaseWare
    b) From Accountview & CaseWare to BEAT-S
    c) From BEAT-S back to Accountview (pushing back journal entries)
    d) From CaseWare to SDU
3) Automatically performed checks of financial administration in Accountview (Samenstelassistent):
    a) Reconciliation of the opening balance sheet with the closing balance sheet of the previous year
    b) Establishing that for every entry the posting date is equal to the transaction date
    c) Establishing that the opening balance of the fixed assets register reconciles with the closing balance of the fixed assets register of the previous year
    d) Establishing that the fixed assets register reconciles with the postings in the administration
    e) Reconciliation of the accounts receivable ledger with the general ledger
    f) Establish that the transitory items from previous financial year are ended
    g) Judge the cash on negative balances
    h) Establish that the entered VAT fully reconciles with the VAT according to the percentage that is established (in the VAT code)
    i) Carry out a summation check on the VAT by associating between:
        i) Turnover according to the general ledger and the turnover according to the tax return
        ii) Turnover and payable VAT
        iii) Purchases/costs and reclaimable VAT
        iv) Payable VAT minus paid VAT en balance position VAT

v) Establish that, if applicable, the sent ICL-returns reconcile with the booked VAT-amounts in the financial administration

4) Automatic creation of the working program in BEAT-S on basis of the filled in parameters and journal entries
5) Support (by BEAT-S) for carrying out the instructions in the working program. This consists out of showing the relevant financial figures with each instruction.
6) Automatic consistency (& recovery) checks in SDU

The above tasks are already automated within the case study company. But it is important to mention that not always all these automation possibilities are used by the employees and some are even unknown. A simple straightforward process improvement possibility is therefore immediately:

XXII. Make sure that all automation possibilities are being used by the employees in the business process.
   a. Let the employees always (when possible) use an electronic administration as input for the process
   b. Let the employees always use the automated input/export possibilities between the different applications in the process
   c. Let the employees always use (when Accountview is used) the 'Samenstelassistent'
   d. Let the employees always use the automated consistency (& recovery) checks in SDU

Besides the already existing automation possibilities only one new automation possibility can be recognized in the As-Is situation, namely:

XXIII. (Partially) Automate more checks of the financial administration which deal with (comparison of) financial figures

Principles 30 & 31 – External Environment – Trusted Party & Outsourcing

Both these best-practices prescribe to use processing capabilities and/or information from outside the company. Outsourcing is an often mentioned best-practice (among others by Klein (1995), Hammer and Champy (1993) and Poyssick and Hannaford (1996)) which prescribes to outsource non-core activities to third parties that can perform them more efficiently. This will (taken into account that the profit-margin of the third party is lower than the efficiency gain) lead to less cost (increased efficiency), but can possibly lead to more coordination efforts (decreased efficiency) and a decreased quality of the work (Reijers and Mansar, 2005).

The outsourcing best-practice is decided to be outside of the scope of this research. This is firstly because in the business process no small parts can be isolated to be outsourced to third parties, which will mean that the entire compilation of the financial statements and/or the entire compilation of the tax return should be outsourced. This will not lead to improving the business process of the case study company, but it will make the whole business process obsolete. Secondly this possibillity was already investigated by the case study company itself, which have decided that this option will not be chosen.

Still, the trusted-party best-practice might be an option, as it is a weaker form of outsourcing. While with outsourcing the business process is executed by a third party upon runtime, the trusted party best-practice prescribes to use information already previously created by third parties (Reijers and Mansar, 2005). The advantages and disadvantages of this best-practice are equal to those of outsourcing.

When this principle is applied to the business process it should be researched which information sources are used and if they are possibly already created by third parties. The information sources

used in the compilation of the financial statemetns is primarily the financial administration of the client, together with some non-financial client information (for the permanent file). If this principle would be applied, it would mean that the financial administration should first be processed by another company and then delivered to the case study company who would consequently compile the financial statement. But firstly, if the client organization has already outsourced their financial administration to another company and they are also clients of the case study company for compiling the financial administration, the principle is already being (implicitly and necesserally) applied. Secondly, when the case study company would ask another administration company for performing the administration it is equal to the outsourcing best-practice, which is out of scope. Thus for compiling the financial statements applying this principle is not possible.

The same reasoning is also applicable to the compilation of the tax returns. Because if a client for a tax return is not the client of the accountancy department, the financial statements created by another company are used. Thus then it is also already applied. Therefore these principles will both not lead to any new possible process improvements.

Principle 32 – External Environment – Interfacing

The interfacing best-practice (Hammer and Champy (1993) and Poyssick and Hannaford (1996)) prescribes to create a standardized interface with clients and any possible partner. The claim is that a standardized interface will decrease the chance of mistakes and incomplete applications/information which possibly results in less errors made (thus increased quality), less rework (increased efficiency) and faster processing times, thus decreased lead time (Reijers and Mansar, 2005).

When this principle is being applied to the case study it should be investigated where there is contact with clients and possible partners. No partners can be recognized in the process, thus this offers no possible process improvements. But with the client there are the contact moments as described in the paragraph of principle 2 (contact reduction). Some of these contact moments could possibly be performed trough a standardized interface, leading to the following process improvement possibillity:

XXIV. Make a standardized interface for all contacts with the client, which are:
   a. requesting the client about his (non-) financial data and information and his response.
   b. sending and receiving the (approved) engagement letter.
   c. sending and receiving the (approved) concept financial statements
   d. sending and receiving the (approved) concept tax return

Principle 33 – Lean Manufacturing (as specification of Principle 5)

As said, principle 33 will be used to have more specific guidelines for eliminating unnecessary tasks (principle 5). The ten types of waste for the service industry are as follows (Bonaccorsi et al., 2011).

1. Defects: Data entry errors; Lost files; Lost or damaged goods
2. Duplication: Data re-entering; Multiple Signatures; Unnecessary Reporting; Multiple Queries
3. Incorrect Inventory: Stock out, Wasting time finding what was needed; Unnecessary copies
4. Lack of customer's focus: Unfriendliness; Rudeness; Poor attention to the customer
5. Overproduction: Reports no one will ever read; Processing paperwork before time; Activities for recovering defects
6. Unclear communication: Incorrect information, Lack of standard data format; Unclear work flow
7. Motion/Transportation: Poor layout; Ineffective filing; Poor ergonomic
8. Underutilized Employees: Inadequate tools; Excessive bureaucracy; Limited authority
9. Variation: Lack of procedures; Lack of standard formats; Standard time not defined

10. Waiting/Delay: Waiting for approvals; Downtime; Waiting for supplies

Already identified during preceding principles

When taking the first two types of waste together it should be recognized that because of data re-entering which (often) takes place on different moments in the business process can lead to data entry errors. Also when no electronic input is used there can be data entry errors. Therefore it is important that all automation possibilities are used as was prescribed already with improvement possibility XXII.

Also a combination of waste types 3 and 7 is already previously mentioned, namely improvement possibility XIV at the paragraph of principles 15 and 29. This was concerning the time wasted on searching the needed documents within the organization (by a tax specialist), because hardcopy documents are not always electronically archived.

Related to waste type 8 the principle about empowerment (nr. 22) is already mentioned. Waste type 8 can be caused by employees having limited authority to make the decisions in the business process, thus also leading to improvement possibility XV.

Related to waste type number 10 is the principle of reducing contacts. Namely due to the multiple contact moments in the process with the client there are some substantial waiting times due to the client having to respond before work can continue. This is not meaning that an employee is literally waiting, but the work-in-process is waiting for the next production step. Thus reducing the contact moments will already decrease this waste.

New process improvement possibilities

In the previous paragraph it was already explained how reducing the contact moments can decrease waiting times. But still there are also possibilities for reducing the existing waiting periods.

XXV. Reduce the time of waiting for clients to respond (and approve)

But this waiting time is due to external stakeholders, but there are also waiting times due to the internal operation of the process. For instance waiting times for the reviews (and approvals) of the financial statements in sub process 5, as well as the waiting time in sub process 8 for the review (and approval) of the concept tax return. Eliminating these reviews is part of another principle, but try to shorten the waiting time is still an applicable process improvement.

XXVI. Reduce the time of waiting for reviewers to review and approve

Also regarding these reviews waste-types 2, 8 and 10 can be identified. Principle 1 (see the beginning of this appendix) already described the different checks (/reviews) that are being carried out in the process. Waste type 2 describes that having multiple signatures (/approvals) can be identified as a waste. And because there are multiple (similar) reviews in sub process 5, this can be identified as waste. When using waste type 8, excessive bureaucracy can be identified, as multiple reviews could be identified as excessive bureaucracy. Moreover, waste type 10 could be identified as these approvals cause waiting times for the work-in-progress. Thus each of these reviews could possibly be reduced/eliminated, leading to:

XXVII. Reduce/eliminate the (amount of) reviews in sub process 1 (3 reviews), sub process 5 (at least 4 reviews) and sub process 8 (1 review)

Regarding a combination of waste types 3, 5, 6 and 10 the following problem can be identified. The ‘samenstelpraktijk’ and ‘aangiftepraktijk’ principally work according to the pull-principle; they only

start compiling financial statements and tax returns when the client has requested these and when the client is actuated. Thus, principally, no overproduction waste exists. But, in practice it appears that sometimes (due to an expected/foreseen time pressure) work is already performed when its preceding activities are not finished yet. For instance the compilation of the trial balance is performed before all information is available (sub process 2/3) or the tax return is already being compiled (sub process 7) on basis of the concept financial statements. In both cases this is being done because it is thought (by the employees in the process) that not much will change when all information is available respectively when the financial statement is finalized. Mostly this appears to be true (S., 2012b, V., 2012), but in some cases the financial figures do change quite significantly leading to rework. This combination of activities is thus a combination of waste types 5 and 6 and forms an area in which improvements are wanted.

XXVIII. Reduce/eliminate working with incomplete or non-finalized financial figures by an assistant accountant or tax specialist, such that less correction rework is needed

In sub processes 2, 3 and 4 the assistant accountant compiles the financial statements and he creates the dossier. Almost always, due to incomplete/inaccurate information, time-pressure and/or insufficient knowledge the assistant accountant makes (small) mistakes/slips (waste type 1). Therefore there are the reviews, as previously explained, by the case manager, responsible accountant, reviewing accountant and tax specialist to assess the completeness and accuracy of the financial statements and the dossier. Also, almost always, corrections consequently have to be made by the assistant accountant to correct (or supplement) the financial statements and the dossier. All these corrections are performed in sub process 5 and can be identified as waste types 5, due to the existence of waste type 1. Therefore this forms an area in which improvements are possible. The same goes for the compilation and review of the tax return in sub process 7, leading to the following improvement possibilities:

XXIX. Reduce/eliminate the mistakes made by the assistant accountant in sub processes 2-4, such that less correction rework is needed

XXX. Reduce/eliminate the mistakes made by the tax specialist in sub process 7, such that less correction rework is needed

Also regarding waste type 9 some possible wastes can be identified. The variation waste consists because of the variation in the process which should be reduced. This can be due to a couple of factors; firstly there can be a lack of pre-defined procedures and processes which have to be followed when an order (in this case engagement) is being processed. This is partly identified in the case study during several interviews. Almost each interviewee responded with the answer that every process is unique and that flexibility of the process is needed to deal with the customer characteristics (customization). But this makes the process not transparent and therefore more hard to compare one execution of the process with another execution. Also related to this aspect is the lack of pre-defined standard times for carrying out specific parts of the process. If different interviewees were asked for processing times for different tasks it was said that also no real estimations are to be made about processing times, due to the heavy dependence on client-characteristics. In the case study, before an engagement is processed, an estimate is made of the hours needed for the different employees to carry out the process based upon the knowledge about the client characteristics. Thus there are times defined for each specific client, but not (really) for specific tasks/processes independent of specific client characteristics. Following waste type 9 a possible process improvement can therefore be:

XXXI. Define a standard procedure for the business process which should be followed together with standard processing times for different parts of the process

Secondly, also a high variation can be detected in the use of annual account schemes and the recording of financial figures in unstandardized way using different types of software applications. As explained in paragraph 3.2.1, the fundamental idea of SBR is the standardization and harmonization of information (taxonomy and structure) using (among others) XBRL in unambiguous processes (in the reporting chain). Also the concept 'store once – report many' is mentioned as the big advantage of the SBR program. This means that data only has to be stored once, but can consequently be reported to multiple granting organizations. This is because the granting organizations share (as much as possible) of the requested financial information concepts. Thus, besides procedures, standard formats can also be used in the process to reduce the variation in the process and to optimally benefit of the 'store once – report many' concept. This leads to the following possible process improvements:

XXXII. Standardize all (/as much as possible) of the in the process used (data-)formats to optimally benefit of the 'store once – report many' concept
   a. Create and always use a standardized annual account scheme based upon the Dutch Taxonomy.
      (There is a standard annual account scheme available for Accountview within the organization, but it is not often used. Also it is not based upon the Dutch Taxonomy.)
   b. Always use the material fixed assets module of Accountview
      (This is important to have a standardized storage of material fixed assets.)
   c. Always (when allowed by regulation) compile a financial statement on fiscal grounds
      (This is aimed at facilitating reporting equal financial information to multiple granting organizations; 'store once – report many'.)
   d. Store the specifications of annual accounts based upon the specifications as mentioned within the Dutch Taxonomy
      (Currently, specifications are often made in Excel and added to the digital dossier/file as an appendix and its recording is not standardized (throughout the organization. When compiling financial statements for a client, the concerning Taxonomy based specification can be used in Accountview (or BEAT-S).
   e. Use a Customer Relationship Management software package to have a standardized storage of non-financial client information
      (Currently, there is a software package used for storing non-financial client information namely FAKT400. This system only allows the storage of basic information, but not the storage of more extended types of information. Like for instance multiple different addresses for the company, its components, its owner and/or its stakeholders. A new software package could be acquired to facilitate this standardized way of storing non-financial client information, or BEAT-S can be extended.)

Another waste type can also be detected, namely a form of waste type 2 (duplication). In the As-Is process multiple different types of software applications are used to facilitate different sub processes, such as Accountview for the bookkeeping, Caseware for creating the reports, BEAT-S for the working program and digital file and consequently SDU for the tax returns. All these software applications originally have different purposes, but nowadays (because of SBR & XBRL) the software applications have overlapping areas of functionality. Also the self-developed software application BEAT-S can be extended to acquire functionality originally offered by other applications. This is a form of duplication because it also leads to having to re-enter (or import/export) financial information from one package to the other, which requires extra time and introduces possibilities for mistakes. This is also related to the SBR program and XBRL, because reducing the number of software applications to store/process financial information achieves the 'store once – report many' concept better. This leads to the following process improvement possibility:

XXXIII. Minimize the use of different software applications, where existing software packages can be extended to take over functionality of others.

Appendix 14. Possible Process Improvements detailed and the development of Scenarios (and groups of principles)

Creating scenarios and using the possibilities of XBRL and software applications

Table 13 in paragraph 8.1 showed the application areas of each improvement and also if they are supporting other improvements or can be regarded as similar. This information gives indications to create scenarios (or groups of improvements) consisting out of multiple separate process improvements. Consequently, some improvements are only prescribing what to improve and not how to implement the improvement. The following paragraph will describe the scenarios (or groups of principles) and describe the implementation possibilities (possibly using XBRL and/or software applications).

Process Improvements already included in the HSA-Project (IV a, VII, XXIV and XXXIII)

But first it is mentioned that process improvements IV a, VII and partly XXIV and XXXIII are part of the HSA-project and are already (being) implemented in the case study company. The (intended) result is that the compilation of the financial statements is run in parallel/integrated with the compilation of the tax return (improvement VII) such that the concept financial statements can be simultaneously discussed with the concept tax return (improvement IV a. Also a standardized interface is created for clients to approve the tax return via an online client portal (partly improvement XXIV). Also the software application for creating the tax returns (SDU) is abandoned for those clients for whom a financial statement is also created, because in those cases the tax return is compiled within BEAT-S.

The exact result of these changes is not yet fully researched and the assessment of these and all following process improvements/scenarios will be researched using the simulation model (were possible) and the expert assessment.

Scenario 1: Process Improvements to integrate with the client (II, V, VI, XXI and XXVIII-XXX)

Process improvement VI is prescribing to integrate with the internal financial accounting process of the client's company. This can be interpreted as the XBRL embedded approach where the XBRL is embedded in the software systems of the client, by which consequently (non-) financial information can be sent continuously towards the accounting firm. This improvement is quite a visionary approach needing a lot of implementation efforts at the client's company. Therefore implementing this improvement seems to be out of scope for this research, but it can give direction towards other implementations as they can be aimed at eventually reaching a XBRL embedded approach.

Another way of implementing this improvement is to gain (continuous) access to the client's administration by letting the client use an online administration package to which the accounting firm has access. The case study company also uses Accountview Online for some clients. This software-as-a-service solution allows the client to perform his administration at his own location, but the accountant can always access this administration from a distance.

Letting clients use Accountview Online also makes it (more easily) to implement other process improvements, such as Improvement XXI (Request the needed information & data on a more frequent basis). Because when clients use Accountview Online information is retrieved on a more regular (actually continuously) basis. Also it makes it easier to implement improvement II (relocating the completeness and reconciliation checks towards the customer). These checks can be regarded as too difficult for the client to perform himself manually. But using the possibilities of the software applications and XBRL these checks can (for a large part) be carried out automatically, and even can

be carried out periodically during the year. The results can then be feed back to the client, who can consequently (try to) improve faults in the administration.

Also when these checks are being carried out before the accountant starts compiling the financial statements, another process improvement is (partially) implemented, namely improvement XXVIII (reduce/eliminate working with incomplete financial information). This is because the client is immediately pointed out that the information is incomplete (or inaccurate) and has the possibility to complement or correct his administration, such that when the accountant starts compiling the financial statements, the possibility of incomplete information is at its lowest. This also means that it is less likely that additional data and information has to be retrieved during the process of compilation (improvement V) and less mistakes will be made during the compilation (improvement XXIX and XXX) as employees are working with (more) complete and accurate information.

Scenario 2: Process Improvements to improve contact with clients and 'educate' them (I, III-IV, XIV, XIX, XXI-XXII, XXV and XXVIII-XXX)

Process improvement XXV is prescribing that waiting-times for clients to respond (and approve) at different times in the process should be reduced, as these cause (major) delays in the process and give rise to quality issues, as for instance the large waiting-times sometimes make employees work with incomplete information (XXVIII), which consequently causes employees to make mistakes (XXIX-XXX). The previous scenario, although in a completely different way, already dealt with these problems/improvements by an intensive integration with the client. But a weakened variant of this scenario is also possible using other (implementation possibilities of these) process improvements, which is a scenario in which the contact with clients is improved.

In the process there are several contact moments with the client, which causes the multiple delays. Several approaches can be used to reduce these contact moments and/or delays. Firstly, combining the contact moments for requesting the client for his data and information with the sending and receiving of the engagement letter (improvement III) introduces one less contact moment and likely also a smaller delay. The same goes for combining the sending of the concept tax return with sending the final financial statements to the client.

Also a principle prescribed to standardize interfaces with clients. A possible way of doing this (following the developments in the accounting sector) is a client-portal to which both the accounting firm and the client have (secured) access and offers the possibility for exchanging documents and giving approvals. In the HSA-project the client-portal is used for the client to approve the tax return before it is being sent to the customer. But this client-portal could also be used for other similar purposes, such as the client sending his (non-) financial data and information, sending and receiving the (approved) engagement letter and sending and receiving the (approved) concept financial statements.

As explained the client is not always responding within an acceptable period. Moreover, the client is also not always providing the accounting firm with complete and accurate information and sometimes in a time-consuming form. Therefore some process improvements are aimed at 'educating' the client to cooperate with the accounting firm in a fast and efficient process.

Firstly the client could be encouraged to respond quicker to requests, for instance it is possible to give discounts to clients responding quickly to requests such that waiting-times for clients are reduced (XXV). Also process improvement XXII prescribes to always try to ask/convince the client for delivering his financial administration in a digital form and not hardcopy, as this saves time at several moments in the process. Besides, the client should also be encouraged more intensively to deliver most of his other non-financial information in a digital form, such that it can easily be archived electronically (XIV).

Secondly, as previously explained, it happens quite frequently that the accountants start compiling with incomplete information. Therefore, a possible process improvement is to lay the responsibility of the accounting firm having complete information with the client (I). The client could for instance receive a list with every possibly needed information (the full standard PBC-list), and should check himself if he gathered all required information. If he consequently makes a mistake, the client could be responsible for the consequences.

Scenario 3: Process Improvements to fully standardize and automate the business process (XIV, XXII and XXXI-XXXIV)

There are also still some possibilities to automate more work in the process, which is likely to increase the efficiency and decrease the lead-time of the process.

First of all, process improvements have been identified which prescribe to make sure employees use all the automation possibilities that are already implemented in the As-Is situation. These are process improvements XIV and XXII, which prescribe to electronically archive all documents and to use electronic input for the process, correctly use the import and export functions of the different software applications and to use the automatic completeness and reconciliation checks of the financial administration (Samenstelassistent).

Secondly there are some other automation possibilities in addition to the ones afore mentioned. For instance there are possibilities for implementing more automatic completeness and reconciliation checks of the financial administration. Also this offers possibilities for a semi-degree of automation to flag/indicate possible problems in the administration to which the employee has to pay attention.

Also, XBRL offers Formula Linkbase to implement taxonomy validation checks and self-developed business rules to validate the internal consistency of the financial statements and/or tax return. These checks can then be implemented and used in the last step of the process being carried out by the employee who compiles the financial statements/tax return and can then immediately correct any mistakes (improvement XXXIV).

As explained in paragraph 3.1, for facilitating an optimal automation of tasks it is needed that the financial information is unambiguously stored, such that it is machine-interpretable. Firstly, the process itself should be standardized more by following standard procedures supplemented with predefined standard processing times (process improvement XXXI). Secondly, process improvement XXXII is aimed at standardizing as much as possible of the in the process used (data-) formats. The concerning appendix (Appendix 13) already explained that this helps realizing the ‘store once – report many’ concept of the SBR program using XBR, increasing efficiency. Thus the Dutch Taxonomy (with its extensions) should be used to standardize formats. For the financial accounting process this leads to the following standardizations:

1. A standardized annual account scheme always to be used in Accountview
2. Always using the material fixed assets module of Accountview
3. Always (when allowed by regulation) compile a financial statement on fiscal grounds
4. Store the specifications of annual accounts based upon the specifications as mentioned within the Dutch Taxonomy
5. Use a Customer Relationship Management software package to have a standardized storage of non-financial client information

All these standardization possibilities will improve automation possibilities as well as helping to exploit most (claimed) benefits from the ‘store once – report many’ concept. Also related to exploiting these benefits optimally is process improvement XXXIII, prescribing to minimize the use of the number of different software packages. Appendix 4 described which software packages are used

in the As-Is situation. Based upon the information models of the financial statements and tax return (as displayed in Appendix 5) and where this information is stored (Appendix 4) the process improvement possibility leads to the following implementations:

1. Stop using Caseware as a report generator and extend BEAT-S with the functionality of creating reports
2. Or stop using Caseware as a report generator and acquire Accountview Report Generator as a replacement

Grouped process Improvements for deciding on a trade-off between a Lean (XI, XV, XVIII and XXVII-XXVIII) or Thick (XIX-XX) process

A typical waste according to Lean Manufacturing is having multiple signatures/reviews and having middle-management to manage employees with limited authority. In the case study these type of wastes are identified, which lead to the hereafter mentioned process improvements.

A possible process improvement (XXVII) is to reduce the amount of (or eliminate all) reviews, while others prescribe to empower employees to have more (decision) authority to carry out those reviews themselves (XI and XV). Assistant accountants can for instance receive all decision authority until the concept is finished and consequently only lets the responsible accountant review the concept financial statements, such that the case manager can be eliminated from the process. Also, it could be that the case manager his involvement is enough and the responsible/reviewing accountant his involvement is not needed (XVIII). Anyway, these improvements will reduce the waiting times for the reviews and approvals (process improvement XXVI). These process improvements are also likely to increase efficiency and decrease lead-time.

But those process improvements may also have a (large) negative effect on the quality of the financial statements and tax return, which is not desirable. Therefore the process improvements XIX (always perform an intensive check of the received data and information) and XX (always let the case manager, responsible & reviewing accountant and tax specialist check the concept financial statements before it is send to the customer) are aimed at improving the quality.

A trade-off should consequently be made between these two extremes, probably depending upon the least acceptable quality level and the efficiency gains associated with it.

Grouped process Improvements to change resource allocation and characteristics (VIII and XII-XIII)

Currently, the case study company follows a customer team approach in which a team of employees are assigned to a customer engagement and carry out most of the tasks within their authority. This leads to having a small amount of assistant accountants assigned to a client, and having one type of every other employee assigned to a client. This is standard practice within the case study and also within the whole sector of accounting firms.

But in contrast to this approach, some principles (and their resulting process improvements) prescribed to change the characteristics of resources and their allocation. One process improvement for instance prescribes to divide the compilation of the financial statements in multiple tasks with clear and defined boundaries (VIII). Consequently, assistant accountants can be assigned to one task for multiple engagements and no longer be assigned to a client (XIII). This also makes it possible to always assign the most specialized resource to a certain task, offering the highest quality and still keeping the most capacity available (XII).

Grouped process Improvements to manage the process as being a manufacturing industry (XVI-XVII and XXXI)

Another group of process improvements all aim at managing the business process as it is more a production process. The process should therefore be managed more strictly and the high customization of the business process should be reduced.

Thus this firstly means that a more standard procedure should be created for the business process which should be followed and that also standard processing times should be identified (process improvement XXXI). This makes the process more transparent (and therefore also better manageable by management and/or BVTA) and it probably makes employees more aware of their performance. When this have been implemented, it is possible to manage the process as being in a more production environment. Then it would be manageable to introduce the TOC process improvements (XVI and XVII). Firstly a buffer before the responsible/reviewing accountant has to be created with concept versions of financial statements and its correct size should be identified and consequently the actuation of clients can be adjusted such that this buffer stays at the correct size. Also consequently the capacity of assistant accountants can be managed such that this buffer stays at the correct size.

Appendix 15. Comparison of Offices using data from the Monitoring Database

- Not in Public Version -

Appendix 16. Comparison of Performance of Offices using the normalized data-set

- Not in Public Version -

Appendix 17. Analysis of data on basis of principles

This appendix performs an analysis on the normalized data set (acquired by combining the hour-registration with that of the monitoring database) to research possible influences of the principles discussed.

Numerical Involvement & Task composition

Regarding the numerical involvement and task composition principles it is investigated if there is a relationship between the number of persons/tasks and the total hours spent on a GLA of a component. Therefore, the correlation between these variables is calculated, as is shown in the tables beneath.

Table 20: Pearson Correlation for Numerical Involvement & Task Composition

		Normalized hours spent (21)	Number of persons involved (21)	Number of tasks registered (21)
Normalized hours spent (21)	Pearson Correlation	1	,304**	,291**
	Sig. (1-tailed)		,000	,000
	N	171	171	171
Number of persons involved (21)	Pearson Correlation	,304**	1	,483**
	Sig. (1-tailed)	,000		,000
	N	171	171	171
Number of tasks registered (21)	Pearson Correlation	,291**	,483**	1
	Sig. (1-tailed)	,000	,000	
	N	171	171	171
		Normalized hours spent (32)	Number of persons involved (32)	Number of tasks registered (32)
Normalized hours spent (32)	Pearson Correlation	1	,380**	,722**
	Sig. (1-tailed)		,000	,000
	N	128	128	128
Number of persons involved (32)	Pearson Correlation	,380**	1	,589**
	Sig. (1-tailed)	,000		,000
	N	128	137	137
Number of tasks registered (32)	Pearson Correlation	,722**	,589**	1
	Sig. (1-tailed)	,000	,000	
	N	128	137	137

**. Correlation is significant at the 0.01 level (1-tailed).

The outcomes shown in the table seem to suggest that there is indeed a (reasonably weak) significant relationship between the total hour spent on compiling a financial statement (21) and the number of persons & tasks associated with the engagement. This relation is even much stronger for the compilation of the tax return (32).

Only, it is rather doubtful if these results can be interpreted in this way. As it is for instance obvious that when an additional employee is associated with the engagement and is being held responsible for reviews is costing more hours than when this review was not been performed (and when the employee was thus not assigned to the engagement). This would thus mean an additional employee (and thus an additional task) which logically results in more hours spent on the engagement. Besides, the inconsistent use of the hours-registration also leads to problems. Some employees write down activities for different components as separate activities (under one client group), while it was carried out as a single activity. Also, the number of components and amount of GLAs was used to explain the variance in the dataset of the financial statements, but still half of the variance is unexplained, meaning that some aspects determining the difficulty of a client are not known. For the tax return even more variance is unexplained. It is therefore likely that more tasks and/or persons are needed for this unexplained added difficulty, thus leading to a correlation in the table above. The table can thus only be used as an indication but cannot be used to draw any conclusion.

Empowerment

This principle is interpreted for the case study as eliminating the involvement of the case manager with the engagement and thus only for compiling the financial statement. Thus it can be researched if engagements having a (large involvement with a) case manager result in more hours spent on the engagement or not. Firstly, this can be done by analyzing if the involvement of the case manager (regardless of how many hours he was involved) with an engagement causes a significant difference. By performing a One-Way ANOVA test it appeared that there is no significant difference between these two groups (F=2,106; Sig.=0,149).

Firstly a diagram is made to investigate other possible sources of empowerment by comparing the involvement of the different types of employees with an engagement. This led to **Error! Reference source not found.** on the following page. On average, the case manager's influence with the engagement is only 20% of the entire engagement, and the higher function levels are limited to only 2-3%. It can be seen that offices having a higher involvement of the case manager have a much lower involvement of the assistant accountants and thus probably also on the total hours spent on the engagement. Therefore a factor representing the % of involvement of the case manager is calculated to test its relationship with the total hours spent on and the efficiency of the engagement and the efficiency, of which the results are shown further down in Table 21.

Thus the involvement of a case manager does reduce the total hours spent on an engagement significantly, but because the case manager is more expensive there is no significant decrease in efficiency. Because the total hours spent on the engagement do decrease significantly it can be concluded that either the case manager works more efficiently (higher productivity) or that he can manage the process such that an assistant accountant is better able to perform his own work.

- Not in Public Version -

Table 21: Pearson Correlation for Empowerment

		Perc_WorkCase Manager (21)	Normalized hours spent (21)	Normalized Costs (21)
Perc_WorkCase Manager	Pearson Correlation	1	-,198**	-,099
	Sig. (1-tailed)		,005	,100
	N	171	171	171
Normalized hours spent (21)	Pearson Correlation	-,198**	1	,954**
	Sig. (1-tailed)	,005		,000
	N	171	171	171
Normalized Costs (21)	Pearson Correlation	-,099	,954**	1
	Sig. (1-tailed)	,100	,000	
	N	171	171	171

**. Correlation is significant at the 0.01 level (1-tailed).

Appendix 18. Model of Applications and Information Flows/Objects (Intermediate Situation of the HSA-project)

- Not in Public Version -

Appendix 19. New Interpretation of the Principles due to the HSA-Project

The HSA-project has introduced changes in the business process and the software applications used for the different steps in the process. The HSA-project therefore leads to new and different interpretations of the principles for process improvements. This appendix will therefore describe the changes that lead to a different interpretation of the principles. In addition, this appendix will describe which principles are already incorporated in the HSA-project.

Already Applied in the HSA-Project

Some of the in Appendix 13 mentioned process improvements are already part of the HSA-project, this paragraph describes those process improvements.

Integration & Parallelism

The integration of the process of compiling the financial statements with the process of compiling the tax return and letting them run in parallel is already part of the HSA-project and is currently (being) applied at the case study company (improvement VII).

Interfacing

A standardized interface is already created for sending and receiving the (approved) concept tax return (improvement XXIV d). But the others still do not have a standardized interface and are therefore sill subject to improvement.

Application because of the HSA-Project

The HSA-project also leads to new process improvement possibilities, these are described below.

Control Addition, Task Automation & Waiting Waste (Lean)

The HSA-project already led to some changes, but these changes give possibilities for differently applying the principles. The HSA-project led to the creation of tax returns in XBRL in BEAT-S. As mentioned in chapter 3, the XBRL taxonomy structure offers possibilities for automatic validation using business rules (and formula linkbase). In this new set-up XML tax returns are being sent towards the XBRL service- and portal provider (see also Appendix 18). At this place in the process the validation checks are being performed, but it is only after the customer has already approved the tax return and the tax return is being sent towards the granting organizations. Also due to the HSA-project, the tax specialists (in cooperation with the accountants) create the tax return in BEAT-S and no longer in SDU. But the automated consistency check in SDU (nr. 6 previously mentioned in the concerning appendix and paragraph) is not incorporated in BEAT-S. Also, following Lean waiting waste, the 'approval' has to be performed immediately and no waiting time should be involved for receiving the response. Therefore these remarks lead to the following possible process improvement:

XXXIV. Incorporate (XBRL) validation/consistency checks of the tax return before it is being sent towards the portal, of which the compiling tax specialist can immediately see the results

Numerical Involvement

As explained in the previous paragraph (Already applied in the HAS-Project) the two first separate processes are now integrated, meaning that two firstly separate departments have to cooperate in

one business process. Thereby, preference is given to fulfill to the integration principle (possible process improvement VII), of which it's influence on performance will already be tested. But the numerical involvement best-practice does mention that lots of coordination times are due to multiple departments operating in the same business process. Therefore, this principle does lead to the following improvement possibility:

XXXV. Improve the coordination and communication between the accountancy & tax specialist departments

Appendix 20. Process Improvements that Could be Tested with the Simulation Model

The table below shows which process improvements could be tested with the simulation model and which process improvements couldn't be tested due to largely the problems encountered with RQ 10.

Table 22: Possibilities of Simulation Model for Testing Process Improvements

Process Improvement	Possibility with the simulation model
IV, IV a & XI (-eliminate)	Can be tested with the simulation model
I, V, VII, IX, XIX, XXI	Can be tested with the simulation model with an added assumption
II, VI, VIII, XXII, XXIII, XXXII, XXXIII	Problems encountered with RQ 10 led to aggregation of sub processes 2 & 3. This improvement is aimed at only sub processes 2 & 3.
XXIX, XXX, XXXIV	Problems encountered with RQ 10 led to the exclusion of causal relations regarding causes and consequences of errors
XXXI	Problems encountered with RQ 10 led to the impossibility of including variances (which are partially based upon preferences)
VIII, XX, XXII-XXIII a	No assumptions regarding knowledge development of specialists are included in the simulation model
XVI-XVIII	No constraint was identified, thus no further research is needed towards this improvement
III, XIV, XXVIII, XXXV	This was not included in the simulation model, as these problems were not known when business process was modeled & simulation model was created (thus not within scope of the modeling nor simulation model)
XX	Is the As-Is Situation as modeled
XXIV & XXV	Workshop (2012) led to the conclusion that XXIV will not improve response times thus has not be tested with the simulation model. Moreover, no implementation of solution XXV was identified thus could also not be tested
XV	The data analysis & Workshop (2012) clearly indicated that the removal of a case manager has a large influence on the time spent by the assistant accountant. This relationship could not be incorporated in the simulation model and therefore there is no validity of the simulation model for testing this process improvement

Appendix 21. Simulation Model Outputs of Tested Process Improvements

This appendix shows the outputs of the simulation model for the process improvements that could be tested (see Appendix 20).

Table 23: Assessment of Process Improvements with Simulation Model

		As-Is situation	HSA-project: VII & IV a)		Improve-ment XI		Improve-ment I		Improve-ment V & XIX		Improve-ment IX		Improve-ment XXI	
Variable	Description	Avg	Avg	%	Avg	%	Avg	%	Avg	%	Avg	%	Avg	%
Lead-Time Concept FS	Actuating till sending concept FS	52,5	58,1	10,8%	58,3	11,1%	54,3	3,5%	41,5	-20,9%	72,6	38,38%	47,8	-8,94%
Lead-Time FS	Actuating till last activity	63,0	70,5	11,8%	70,6	12,1%	71,4	13,2%	55,3	-12,3%	80,9	28,37%	58,6	-7,09%
Lead-Time Both Products	Actuating till sending concept TR to client	64,8	58,2	-10,3%	75,5	16,4%	82,6	27,4%	62,0	-4,4%	82,4	27,01%	64,1	-1,22%
Lead-Time Concept TR	First activity TR till sending concept TR to client	3,9	6,6	69,3%	3,6	-7,9%	4,0	3,4%	3,9	-0,1%	3,8	-0,98%	4,1	5,01%

Appendix 22. Summary of Workshop and Overall Results (Office Rotterdam)

The workshop was held on the 20th of August 2012 from 9:30 am until 11:30 am. The location for the workshop was Office Rotterdam. Because this office was chosen as the As-Is situation, participants were needed of office Rotterdam. Therefore it was deliberately held at their own office in order to ensure that they felt as comfortable as possible to give honest answers. The participants of the workshop were:

1. Beginning Assistant Accountant, age 20-30, man. Was reasonably active in the discussion
2. Advanced Assistant Accountant, age 20-30, man. Was reasonably active in the discussion
3. Assistant Tax Specialist/Advisor, age 20-30, man. Was active in the discussion
4. Assistant Tax Specialist, age 30-40, women. Was reasonably quiet in the discussion
5. Casemanager (Accountant), age 30-40, man. Was active in the discussion
6. Casemanager (Accountant), age 40-50, man. Was reasonably quiet in the discussion
7. Tax Advisor / Head of Tax Department & Accountant RA, age 50+, man. Was clearly present in the discussion

Besides me, as workshop leader, I was supported with the help of Jan Kalisvaart. Jan Kalisvaart began the workshop with an introduction of the HSA-Project and consequently shortly introduced the motive for my thesis project. Jan Kalisvaart his presence was needed for having the right authority to schedule the workshop and to acquire enough employees for the workshop. Moreover, his introduction of the HSA-Project and the motive for my research clearly showed the significance of the workshop for the participants. During the discussion his help was valuable when some information was missing for all participants and myself, because he could fill in the gaps. Secondly, he also sometimes supported the discussion by asking more specific questions. It is possible that the presence of Jan Kalisvaart has influenced the expressed opinion of the participants. But, the participants never seemed to withhold their opinion and did not appear to be reserved or 'scared' in sharing their opinion. Therefore it is thought that his presence did not have a significant influence on the results of the workshop.

I consequently introduced myself and shortly discussed the agenda for the workshop, which was as is shown in the list below. Also, this list is supplemented with short summaries per subject.

1. Introduction to the HSA-Project and motive for my research by Jan Kalisvaart (10 min.)
2. Introduction to my thesis project (motive, goals and methods of research) (10 min.)
    a. Including the reason for and significance of the workshop
3. Short animation of simulation + Discussing if outcomes of simulation reflect reality (10 min.)
    a. Hours of employees for compiling a financial statement are largely validated. Possibly the really small ones have a little bit too much involvement of the function levels 'Casemanagers until Responsible Accountant'
    b. Hours of employees for compiling a tax return (validated)
    c. Total lead-time for compiling a financial statement (validated)
    d. Total lead-time for compiling a tax return is largely falsified. The presented total lead time was too long. This possibly is due to the choice of the dates used in the simulation model. The starting date in the simulation model was chosen to be set at the date after which the financial statements were finished and could be used for the tax return. But, as the participants see it, the starting date of compiling a tax return is set at the beginning of the first activity. This discrepancy, and intermediate time period, is very likely to be the reason of the falsification. The participants said that it is almost all finished within one week.

4. Explanation of the Survey Statements and Possible Improvements and how they should be scored. Also explaining to first score customer- and employee satisfaction and how. (5 minutes)
    a. Including the presentation of an example
5. Survey (25 minutes)
    a. Participants were able to fill in the survey in 25 minutes
    b. Observations
        i. No participant thought of their own/new indicators for customer- and employee satisfaction
        ii. Sometimes whispers between the assistant tax specialists
        iii. Participant 7 was fairly quick in filling in his survey. Later replied that black- and white 'questions' get 'black- and white answers'. Responded that this is actually the intention and that refining answers is possible in the discussion.
        iv. Statements were mostly fairly simple to fill in but some possible improvements were a bit hard
        v. All participants were not aware of the already current automation possibilities (Samenstelassistent)
    c. Limitation:
        i. Some questions are specifically aimed at tax specialists or at specifically the accountants. Due to the limited size of the separate groups (respectively 3 and 4, as well as one participant that is both) these questions require careful interpretation.
6. Discussion about the Statements and Possible Process Improvements
    a. Waiting-times
        i. The time that clients take too respond to different inquires is sometimes much too long. This disturbs the normal process. Also, these waiting times decrease the efficiency of compiling the financial statements and form a significant part of the total lead time. Specifically for the tax specialists, these waiting times cause problems for fulfilling the deadlines set by the Tax & Customs Administration.
        ii. The participants do not (immediately) see possibilities for improving this contact. Combining contact moments nor a client portal would likely increase the responsiveness of clients. But they do recognize that it is a significant problem which should be dealt with. Also, likely the engagement for these clients are not even profitable. Therefore they think that decisions about keeping these clients should be performed at partner-level.
    b. Working with incomplete information or concept figures
        i. Working with incomplete information is indeed less efficient
        ii. Sometimes this is even known in advance, but still it is decided to work on the engagement. This is because sometimes there is no other work to do, thus employees have to work on something.
        iii. Sometimes it is not directly known in advance, but the participants are in the opinion that it is not really detectable in advance
            1. Although, the participants do mention (later on) that checking if all information from the PBC-list have been delivered will decrease the chance of incomplete information. Also, it is said by one case manager that not always (possibly 70%) the delivered information is checked.
    c. Number of Reviews / Checks
        i. Participants do not think that work in progress has to wait long for being reviewed by one of the reviewers

ii. Outcomes of simulation are also showed. These suggest that the possible longest waiting-time is only 5 days. These outcomes are supported (and validated) by the opinions.
iii. Participants do recognize that sometimes the review of the reviewing accountant is superfluous, mostly in the case of small/easy clients. Also, the review of the tax specialist not always appears to be carried out before the financial statements are finalized and made definitive. But this is interpreted as unacceptable.

d. Specializing Accountants
   i. No specialization has to be performed to different tasks in the process. This is (highly likely) much less efficient, and not more efficient as theory possibly mentions it. In this sector, due to the fact that it is knowledge intensive, it is important to know the client characteristics. Therefore it is much better to carry out all tasks for one client, then performing one task for multiple different clients.
   ii. Specialization is possible for branches and probably best for a client with a negative financial situation. But for branches there are not enough clients in most of the separate branches to specialize employees. Therefore it is better to keep generalists. But with enough volume, specialization to branches (or other client types) is assessed as being an improvement. Efficiency and quality are likely to increase, but employee satisfaction will collapse.

e. Missing aspects
   i. Speed of the used applications (specifically BEAT-S) has to increased significantly
   ii. User-friendliness of BEAT-S and Client-Portal has to be increased
   iii. BEAT-S is often containing too much questions / instructions, by which it sometimes becomes a blanks exercise to fill them all in / approve them. An idea is to introduce BEAT-S light. A version with much less questions / instructions which can be used for the reasonably small clients for which the current BEAT-S is overkill and thereby decreasing efficiency.

7. Discussion about Scenario's
   a. Scenario 1: Always Online!
      i. For those clients who not already have a financial administration package it is a good idea. But larger companies already have their own financial administration package/application, for which it is unlikely that they will change to a different application
      ii. It will improve the possibilities for the accountant to advice and check the client, because he will have up-to-date information during the entire year. Information will probably be more complete.
      iii. It is unlikely to feed back the result of completeness and reconciliation controls too clients to give them the opportunity for correcting the financial administration. It is said that this probably only leads to a financial administration with lesser quality (because wrong alterations are made) than a financial administration with a higher quality.
   b. Scenario 2: Educate your Clients!
      i. Not discussed due to a higher priority for Scenario 3
   c. Scenario 3: SBR/XBRL Factory
      i. After the scenario was explained, it took some time for the participants too express their opinion
      ii. In my opinion, the knowledge of the participants about standardization following SBR and automation due to XBRL was limited. The participants were, for instance, not familiar with the term taxonomy or with the

possibilities of different software applications used (such as the Samenstelassistent)

iii. Standardization of the work process is not really appreciated. Autonomy of employees is thought to be important, also adaptations of the process to client characteristics is important.
iv. During the first half of the entire discussion the emphasis of the uniqueness of each client was very strong. At the end of discussing this scenario participants said that standardization (of annual account schemes and specifications) could be possible for approximately 70% of the clients. But it is therefore very important that all possibilities are kept open for making alterations that are wanted by specific clients. Participants think that it is indeed possible to differentiate in price for these standardized clients and specific clients, but that, due to their different needs, it is permitted. The same goes for the fiscal financial statements. This standardization is thought to have a positive influence on efficiency and lead time.
v. Having standard texts (for clarifications and foundations) is very welcome and being pointed at the necessity of adding them is also very welcome. Is thought to have a positive influence on the efficiency and lead time.
vi. Module 'material fixed assets' is thought not to have an interesting positive influence on the efficiency or quality
vii. Having validation checks (completeness, reconciliation and other consistency checks) incorporated in the software applications used will improve efficiency and lead time. Also quality will increase.
viii. Having advanced automation possibilities ('Samenstelassistent') could significantly help efficiency and can improve possibilities for empowerment. Necessity is to be able to import all different electronic administrations.

Appendix 23. Summary of Survey results (performed in Workshop)

This appendix describes the results of all statements and possible process improvements. All statements and possible improvements surveyed are mentioned and the associated results are showed in the tables beneath. Average scores are colored with the highest value green, the lowest value red and the most intermediate value yellow.

Table 24: Workshop: Scoring of Indicators for Customer- and Employee Satisfaction (Min, Avg, Max per discipline)

Indicators:	Weight:											
	Accountants (N=5)				Tax Specialists (N=3)				All (N=7)			
Customer satisfaction (total 15 points)	*Min*	*Avg*	*Max*	*N*	*Min*	*Avg*	*Max*	*N*	*Min*	*Avg*	*Max*	*N*
Costs	1	3,8	8	5	4	6	8	3	1	4,1	8	7
Lead-Time	2	2,6	4	5	2	2	2	3	2	2,4	4	7
Time between completion of financial statements (and tax return) and end of financial year	2	2,8	5	5	1	3,3	5	3	1	2,7	5	7
Possibilities for client-specific products	0	2	4	5	0	0,7	1	3	0	1,7	4	7
Quality of Financial Statements and Tax Return	0	2,2	4	5	0	2,3	4	3	0	2,6	4	7
(Personal) Contactmoments	0	1,6	3	5	0	0,7	1	3	0	1,4	3	7
Employee Satisfaction (total 15 points)												
Challenging tasks (Opportunities for knowledge development)	3	4,6	7	5	3	5,3	7	3	3	4,6	7	7
Autonomy	2	3	4	5	2	2,7	4	3	2	2,7	4	7
Experiencing responsibility (knowing where to be responsible for; oversee own contribution)	2	2,8	4	5	2	2,7	4	3	2	2,6	4	7
Involvement/Contacts with Client	0	2,6	4	5	0	2,3	4	3	0	2,9	4	7
Involvement with each phase in the entire process	0	2	3	5	0	2	5	3	0	2,3	5	7

Table 25: Workshop: Scoring of Statements (Min, Avg, Max per discipline)

Princ.		**Statements**	**Accountants (N=5)**				**Tax Specialists (N=3)**				**All (N=7)**			
Statements specific about contacts with clients			*Min*	*Avg*	*Max*	*N*	*Min*	*Avg*	*Max*	*N*	*Min*	*Avg*	*Max*	*N*
XXV	1	Often there have to be waited a long time before clients respond to a request or approve a document.	2,0	3,6	4,0	5	2,0	3,0	4,0	3	2,0	3,3	4,0	7
XXV	2	These waiting-times make the process more inefficient.	4,0	4,4	5,0	5	2,0	4,0	5,0	3	2,0	4,1	5,0	7
V & XXVIII	3	When it appears during compilation that the information is non-complete, additional information has to be requested. This causes the compilation to be less efficient than when all information was available at start.	4,0	4,2	5,0	5	4,0	4,3	5,0	3	4,0	4,3	5,0	7
XXV	4	The total lead time of the engagements is largely determined by the waiting times for the client.	4,0	4,0	4,0	5	3,0	3,3	4,0	3	3,0	3,7	4,0	7
XXI	5	When information of the client (the PBC-list/material) is requested more often (for instance quarterly) there is a higher chance that the information is complete when staring compilation.	2,0	3,8	5,0	5	2,0	3,0	4,0	3	2,0	3,7	5,0	7
Statements specific about possibilities for automation (and the arrangement of work)														
XXII & XXIII	6	The current completeness- and reconciliation checks of the 'Samenstelassistent' (in Accountview) save much time (certainly one hour) during the compilation of financial statements.	3,0	3,0	3,0	1	0,0	0,0	0,0	0	3,0	3,0	3,0	1
XXII & XXIII	7	When the 'Samenstelassistent' is expanded with almost all completeness- and reconciliation checks it will even save much more time during the compilation of financial statements.	4,0	4,0	4,0	1	0,0	0,0	0,0	0	4,0	4,0	4,0	1
XXII	8	Accurate use of the module 'material fixed assets' saves time during compilation of the financial statements.	3,0	3,6	4,0	5	3,0	3,0	3,0	1	3,0	3,6	4,0	5
XXII	9	Accurate use of the module 'material fixed assets' makes sure that the relevant financial figures are recorded with higher quality.	3,0	3,6	4,0	5	4,0	4,0	4,0	1	3,0	3,6	4,0	5
XXXI	10	The working process always have to be carried out by strictly following the predefined standard procedure as dictated by BEAT-S	2,0	3,0	5,0	5	2,0	2,0	2,0	1	2,0	3,0	5,0	5

XXII	11	If the client delivers an electronic administration, the compilation of the financial statements is much more efficient than when clients deliver a paper administration.	3,0	4,0	5,0	5	4,0	4,0	4,0	2	3,0	4,0	5,0	6
XXII	12	Often during manually retyping information from Accountview to Caseware mistakes are made. (Fill in 0 when this is never done manually).	1,0	3,2	5,0	5	4,0	4,0	4,0	1	1,0	3,2	5,0	5
IX	13	All separate and different tasks in the planning & preparation phase now take more time, than when they are performed as one activity by one person.	2,0	3,3	4,0	4	4,0	4,0	4,0	1	2,0	3,3	4,0	4
XXII	14	If the trial balance is automatically calculated from a digital administration and the completeness- and reconciliation checks are automatically being performed it is hard to train (/break) new assistant accountants (in). These tasks are perfect for breaking in new assistant accountants.	4,0	4,3	5,0	3	4,0	4,0	4,0	1	4,0	4,3	5,0	3
Statements for tax specialists (if you as an accountant have an idea, please fill it in!)														
XXVIII	15	If the tax specialist compiles the tax return using the concept financial figures of the financial statements and the final financial figures are changed, it requires a lot of rework / extra work.	3,0	3,5	4,0	4	4,0	4,0	4,0	3	3,0	3,7	4,0	6
XXX & XXII	16	Often mistakes are made when manually retyping information from the financial statements (/Caseware) to SDU.	2,0	2,5	3,0	2	2,0	2,3	3,0	3	2,0	2,5	3,0	4
XXIV	17	Approving the tax return via the client portal makes client respond more quicker	2,0	2,0	2,0	1	2,0	2,0	2,0	1	2,0	2,0	2,0	1
XXIV	18	Approving the tax return via the client portal is more efficient	3,0	3,7	4,0	3	3,0	3,0	3,0	1	3,0	3,7	4,0	3
XXV	19	It is often difficult to fulfill to the time extension ruling, therefore sometimes even tax returns are send to the Tax & Customs Administration of which no official agreement is received.	4,0	4,0	4,0	2	3,0	3,7	4,0	3	3,0	3,8	4,0	4
Statements specific about reviews and controls														
XI & XVIII	20	It often takes a long time when the tax specialist has reviewed the (tax position in the) financial statements. This causes a significant increase in lead-time.	2,0	2,5	3,0	4	3,0	3,7	4,0	3	2,0	3,0	4,0	6
XXVII	21	All reviews (by the 4 different accountants) of the concept financial statements make the process less efficient.	2,0	3,4	4,0	5	3,0	3,7	4,0	3	2,0	3,4	4,0	7
XXVII	22	All reviews (by the 4 different accountants) also largely increase the lead time, because it often takes a long time before these reviews have been performed.	3,0	3,6	4,0	5	4,0	4,0	4,0	3	3,0	3,7	4,0	7
-		Often, important (/significant) corrections have to be performed following a review of the financial statements performed by:												

XXVII	23	the case manager	4,0	4,2	5,0	5	4,0	4,0	4,0	1	4,0	4,2	5,0	5
XXVII	24	the responsible accountant	2,0	2,6	4,0	5	3,0	3,0	3,0	1	2,0	2,6	4,0	5
XXVII	25	reviewing accountant	1,0	2,0	3,0	5	3,0	3,0	3,0	1	1,0	2,0	3,0	5
XI, XVIII & XXVII	26	tax specialist (tax position)	2,0	2,0	2,0	4	2,0	3,0	4,0	2	2,0	2,4	4,0	5
XXVII	27	Some of these reviews are unnecessary.	2,0	2,8	4,0	5	3,0	3,0	3,0	1	2,0	2,8	4,0	5
XX	28	All above mentioned reviews should always be performed before the concept version of the financial statements is sent to the client.	2,0	3,6	4,0	5	4,0	4,0	4,0	3	2,0	3,7	4,0	7
XX	29	All above mentioned reviews should always be performed before the financial statements are finalized.	2,0	2,8	4,0	5	2,0	3,7	5,0	3	2,0	3,3	5,0	7
-		Corrections that have to be made (following the reviews) concern corrections of mistakes made by:												
XXIX & XXII	30	forgetting to process financial figures which do have been provided by the client	2,0	2,8	5,0	5	2,0	2,0	2,0	1	2,0	2,8	5,0	5
XXIX & XXII	31	wrongly entering or processing financial figures	2,0	3,2	4,0	5	2,0	2,0	2,0	1	2,0	3,2	4,0	5
XXVIII	32	There is a high probability that the final financial figures differ from the concept financial figures in the concept financial statements.	2,0	2,6	3,0	5	2,0	3,0	4,0	2	2,0	2,8	4,0	6
XXXV	33	The communication & cooperation between the accountants and tax specialists must be improved.	3,0	3,6	4,0	5	4,0	4,3	5,0	3	3,0	3,9	5,0	7
XXVIII	34	The meeting for discussing the concept financial statements often results into making, for the client, important corrections.	2,0	2,8	4,0	5	2,0	3,0	4,0	2	2,0	3,0	4,0	6
XXVII	35	Often important corrections have to be made following the review of the responsible tax specialist of the concept tax return.	2,0	2,0	2,0	4	2,0	2,7	3,0	3	2,0	2,3	3,0	6

Blue boxes mean that a low number of the total participants have responded to this statement

Table 26: Workshop: Scoring Possible Process Improvements (Average of each improvement on each indicator, per discipline)

Possible Process Improvements (average scores per indicator per discipline)			Accountants (N=5)					Tax Specialists (N=3)					All (N=7)				
Princ.		***Possible improvements about the contacts with client (and automation)***	Efficiency	Lead-Time	Quality	Customer Satisfaction	Employee Satisfaction	Efficiency	Lead-Time	Quality	Customer Satisfaction	Employee Satisfaction	Efficiency	Lead-Time	Quality	Customer Satisfaction	Employee Satisfaction
II	1	By using automatic checks and controls, the client can be pointed out that his electronic administration is (possibly) not complete or does not reconcile, before the administration is treated by the accountant.	4,4	4,2	3,8	3,2	4,0	4,3	4,3	3,7	3,7	4,0	4,4	4,3	3,7	3,4	4,1
I	2	The client must be made responsible for delivering complete and accurate information (PBC-material), therefore he himself has to perform a more intensive check before delivering this information.	4,4	4,0	3,6	2,2	3,6	5,0	5,0	3,7	3,0	4,7	4,6	4,3	3,6	2,6	4,0
VI	3	All clients strongly have to be encouraged to perform their own administration in Accountview Online.	4,0	3,6	3,2	2,6	3,8	4,5	4,0	3,0	1,5	4,0	4,2	3,7	3,2	2,5	4,0
V, XIX	4	An intensive check of the PBC-material always have to be performed to ensure that the (by the client) delivered information is complete to prevent having to request additional information later on.	3,6	3,6	3,4	3,0	3,6	3,3	3,7	4,0	4,3	3,7	3,6	3,6	3,7	3,4	3,6
XXIV	5	The client portal has to be used for all contacts with the client.	4,0	3,6	2,8	2,2	3,6	4,0	3,5	3,0	2,5	4,0	4,2	3,7	2,8	2,5	3,8
Possible improvements about arranging work																	
IV a & VII	6	The financial statements and tax return always have to be compiled simultaneously (in BEAT-S), such that both concept versions are finished simultaneously.	4,6	4,2	4,0	4,4	3,8	4,7	4,7	4,0	5,0	4,3	4,7	4,4	4,0	4,6	4,1
VIII & XIII	7	No longer an assistant accountant has to perform all tasks in the process, but he has to be specialized in carrying out certain tasks in the process (for example only the administration, or creating the reports).	3,0	2,6	3,0	2,8	1,6	2,0	2,5	2,5	2,0	1,0	2,7	2,7	3,0	2,7	1,5
X	8	Some assistant accountants and case managers have to be specialized in clients with a negative financial situation and only perform those engagements.	3,2	3,0	3,6	3,0	1,6	3,0	3,0	3,5	3,0	1,5	3,3	3,2	3,5	3,2	1,7
XIII a)	9	All assistant accountants and case managers have to be specialized in clients of a specific (or certain) line(s) of industry and only perform those engagements.	3,6	3,4	3,6	3,2	1,8	4,0	4,0	3,5	3,5	2,0	3,7	3,5	3,5	3,3	1,8
XIV	10	All, without exception, (compiled) documents have to be electronically archived (in BEAT-S) in all cases, such that all concerning employees (and especially the tax specialist) has access too all needed documents.	3,8	3,6	3,2	3,0	4,2	4,7	4,7	4,7	4,0	4,3	4,1	4,0	3,7	3,4	4,4

XV	11	The case manger does not have to be involved with engagements for the largest part of the clients (the small ones), such that assistant accountants perform these engagements themselves and only in the end put their work up for review of the responsible accountant (and other reviewers).	3,4	3,4	3,0	3,0	3,6	1,5	1,5	1,5	1,5	2,5	3,0	3,0	2,7	2,7	3,2
Possible improvements about standardization and automation																	
XXXII	12	A, by the case study company developed, standard annual account scheme always has to be used for performing administrations in Accountview (and compiling in Caseware) for all clients. When a client wants to deviate from this, he has to be pointed out that this results into higher costs.	4,2	3,6	3,6	1,8	3,8	4,0	3,0	3,5	2,0	3,5	4,2	3,5	3,5	2,0	3,8
XXXII	13	A fiscal financial statement always has to be compiled, such that no/less financial figures have to be transformed for the financial statement and also saving time for the tax return. When a client wants to deviate from this, he has to be pointed out that this results into higher costs.	3,2	3,2	3,0	2,0	3,4	3,0	2,3	3,3	2,7	3,7	3,3	3,0	3,3	2,4	3,6
XXXII	14	Recording specifications, from now on, has to be performed in a standardized way (such as it is granted by the T&CA, CoC and banks) in Accountview or BEAT-S. These may no longer be performed in Excel.	3,4	2,8	3,0	3,2	2,4	3,7	3,7	4,0	3,7	3,3	3,6	3,1	3,3	3,4	2,9
XXXII	15	BEAT-S has to be extended with functionalities to record (in a standardized way) more advanced non-financial information that is granted, such as addresses of all locations, information of shareholders, contact persons, etc.	3,8	3,0	3,6	3,0	3,4	4,3	2,7	4,0	3,7	4,0	4,0	3,0	3,7	3,3	3,7
XXXII I	16	Accountview has to be expanded with report generator functionalities, such that Caseware no longer has to be used and financial figures are thus stored in only one application	4,7	4,3	3,3	3,0	4,0	4,0	4,0	4,0	4,0	4,0	4,5	4,3	3,5	3,3	4,0
XXXI V	17	BEAT-S has to be expanded with validation checks for the tax return (completeness, reconciliation and consistency) which should be possible to invoke immediately by the assistant tax specialist such that he can immediately see the results and make the necessary corrections (even before the review is performed by the responsible tax specialist).	3,6	3,6	3,4	3,2	3,8	3,7	2,7	4,0	3,3	3,7	3,6	3,3	3,6	3,3	3,7
Possible improvements about the communication & collaboration between the different departments																	
XXXV	18	The planning in BEAT-S always has to be filled in accurately by the accountants and tax specialists, by which the mutual planning and synchronization between the different departments will be improved.	3,8	3,6	3,2	3,4	3,8	4,0	4,0	4,0	4,0	4,0	4,0	3,9	3,6	3,7	4,0
XXXV	19	The tax specialists have to be able to give priorities (or deadlines) to different clients, which the accountant has to follow (as much as possible).	3,4	3,4	3,0	3,8	3,3	3,7	3,3	3,3	4,3	4,3	3,6	3,4	3,2	4,0	3,8

Blue boxes mean that a low number of the total participants have responded to this possible process improvement

Appendix 24. Summarized Results of Process Improvements and BPM Principles

Firstly, for creating the survey some process improvements that were quite generally stated were translated into (sometime multiple) specified improvements as they are also discussed in the scenarios of Appendix 14.

Secondly, some possible process improvements were fully transformed into statements, with which only the impact on the most likely influenced indicators was asked. For deciding on the most likely indicators to be impacted, the theory was used that described the originating principle. These most likely influences of the process improvements are already explained and discussed in Appendix 13. Also, some possible process improvements were, besides being presented as a process improvement in the survey, also supported by statements to specifically focus the attention of the participants to the impact of one of the most likely indicators of the concerning improvements.

Thirdly, another transformation has been performed when creating the survey, namely the fact that some process improvements have been let out (improvements III-IVa and XVI-XVIII). This has been done because process improvements III-IVa are based upon the precondition that the employees indeed have to wait long on clients to respond to requests, and are therefore specific implementations of improvement XXV (reducing waiting-times for clients to respond). Because the possible process improvements are not likely to have a major impact (based on theory) on the other indicators, these specific process improvements (III-IVa) were let out and participants were only asked about the underlying problem of waiting long for clients to respond (XXV). Following this same reasoning, improvements XVI-XVIII have been let out of the survey. Moreover, this has been done because these improvements (based upon Theory of Constraints) are quite difficult to understand for the participants. Lastly, also improvements XXIX-XXX (reducing the amount of mistakes) have been let out, because they were far too general improvements to evaluate. Because this research is also focused on XBRL, some other statements were presented to the participants, with which it could be decided if XBRL could contribute to a reduction in the amount/extent of the mistakes.

See the table on the next pages for the results of the survey summarized per possible process improvement.

Table 27: Results of Survey summarized for Process Improvements

Possible Process Improvement	Statements (Survey)	Specified Possible Process Improvement (Survey)	Degree of Agreement with Statement	Efficiency		Lead-Time		Quality		Cust. Satisf.		Empl. Satisf.	
				Avg of Statements	Avg of Possible Process Improvements	Avg of Statements	Avg of Possible Process Improvements	Avg of Statements	Avg of Possible Process Improvements	Avg of Statements	Avg of Possible Process Improvements	Avg of Statements	Avg of Possible Process Improvements
I		2			4,6		4,3		3,6		2,6		4,0
II		1			4,4		4,3		3,7		3,4		4,1
V	3			4,3									
VI		3			4,2		3,7		3,2		2,5		4,0
VII		6			4,7		4,4		4,0		4,6		4,1
VIII		7			2,7		2,7		3,0		2,7		1,5
IX	13			3,3									
X		8			3,3		3,2		3,5		3,2		1,7
XI	20 & 26					3		3,6					
XII	This was based upon the precondition of the existence of specialists – generalists, which was not apparent and could thus not be asked in the survey												

XIII		7			2,7		2,7		3,0		2,7		1,5
XIII a)		9			3,7		3,5		3,5		3,3		1,8
XIV		10			4,1		4,0		3,7		3,4		4,4
XV		11			3,0		3,0		2,7		2,7		3,2
XIX		4			3,6		3,6		3,7		3,4		3,6
XX	28 & 29		3,7										
XXI	5		3,7										
XXII	6, 8, 9, 11,12, 14, 16, 30 & 31			3,5				3,1					
XXIII	7 & 14			4								1,7	
XXIV	17 & 18	5		3,7	4,2		3,0		2,8		2,5		3,8
XXV	1, 2 & 4			4,1		3,5							
III	These are Specific Process Improvements to implement XXV (above) and are therefore not separately measured. In discussion it appeared it will probably not have a significant impact or is sometime already done												
IV													
IV a													
XXVI	20 & 22					3,4							
XXVII	20-27 & 35		2,8	3,4		3,4		3,3					
XVI	These are Specific Process Improvements aimed at repairing												

XVII	problems due to XXVI & XXVII and are quite technical. It is therefore only measured if these problems even exist												
XVIII													
XXVIII	3, 15, 32 & 34			4,0									
XXIX	Because XXIX & XXX are no specific process improvements, Statements 16, 30 & 31 were asked to identify which if mistakes are made that could be overcome with XBRL / automation												
XXX													
st 16			2,5	2,5									
st 30 & 31			3	3									
XXXI	10		3										
XXXII		12, 13, 14, 15			3,8		3,2		3,4		2,8		3,5
XXXIII		16			4,5		4,3		3,5		3,3		4,0
XXXIV		17			3,6		3,3		3,6		3,3		3,7
XXXV	19, 33	18, 19	3,9		3,8	3,8	3,6		3,4		3,9		3,9

The table below furthermore shows the process improvements which resulted from applying the principles to the case study, together with the average score of that process improvement resulting from the survey. Consequently, an average is calculated for each BPM principle resulting from all the scores of the individual process improvements.

Table 28: Summary of Survey for Scores per BPM Principle

Principle	Resulting Process Improvements and averaged score per improvement							Scores per Principle		
								Min	Max	Avg.
1	I	**II**						3,8	4,0	3,9
	3,8	4,0								
2	III	IV (a)	V					4,3	4,3	4,3
	N.I.S.*	N.I.S.*	4,3							
3	**VI**	**VII**						3,5	4,4	3,9
	3,5	4,4								
5 & 33	III	IV (a)	XIV	XV	**XXII**	XXV	XXVI	2,9	4,0	3,5
	N.I.S.*	N.I.S.*	3,9	2,9	3,3	3,8	3,4			
	XXVII	XXVIII	**XXIX**	**XXX**	XXXI	**XXXII**	**XXXIII**			
	3,2	4,0	N.S.***	N.S.***	3,0	3,3	3,9			
7, 8 (&9)	VIII	IX						2,5	3,3	2,9
	2,5	3,3								
10	**VII**							4,4	4,4	4,4
	4,4									
12 & 21	X							3,0	3,0	3,0
	3,0									
14	XII									
	N.I.S.**									
15 & 29	XIV							3,9	3,9	3,9
	3,9									
19	XI	XXXV						2,8	3,7	3,3
	2,8	3,7								
21	XIII	XIII a)						2,5	3,2	2,8
	2,5	3,2								
22	XV							2,9	2,9	2,9

	2,9						
24	XVI	XVII					
	N.I.S.**	N.I.S.**					
25	XVIII						
	N.I.S.**						
26	XIX	XX	**XXXIV**		3,5	3,7	3,6
	3,6	3,7	3,5				
27	XXI				3,7	3,7	3,7
	3,7						
28	**XXII**	**XXIII**	**XXXIV**		2,8	3,5	3,2
	3,3	2,8	3,5				
32	XXIV				3,3	3,3	3,3
	3,3						
4, 16, 23 & 30	*Did not lead to any process improvement*						
6 & 11	*Lead to a process improvement falling outside scope of research*						
13, 17 & 18	*Standard practice within accountancy sector*						
20 & 31	*Principle itself was out of scope for research*						

N.I.S. * = Not In Survey, but has been discussed as not offering a significant improvement
N.I.S. = Not In Survey, but targeted problem seem not to exist or precondition was not satisfied**
N.S. * = Not Specific enough improvement to be included in the survey, but the existence of the problem have been surveyed**
Bold Improvement numbers (I-XXIV) are associated with XBRL

Part E. Scientific Article

Business Process Management in the Accountancy Domain

Improving business processes of knowledge-intensive organizations in the financial services industry

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ABSTRACT

Market pressure for cost-efficiency is forcing, and the implementation of XBRL is enabling, accounting firms to optimize their business processes to become more cost-efficient. While the manufacturing industry has benefited much from available BPM methodology for becoming more agile, leaner, cost-effective and customer-focused, it is still unsure how BPM should be applied in the services industry and especially in knowledge-intensive organizations for benefiting from digitalization and standardization. A case study research is performed to investigate how, and which, BPM principles can best be applied for the utilizing digitalization and standardization in knowledge-intensive organizations in the financial services industry. The case study research entails a process analysis, simulation and improvement of a business process from an accounting firm. The research suggests that existing BPR principles and Lean Management offer concrete support for improving these types of business processes using XBRL, but that it is difficult to quantitatively validate these improvements. To improve the possibilities for adequate quantitative validation of process improvements, future research should be focused upon identifying measurable indicators for the efficiency and quality of knowledge-intensive business processes (in the financial services industry).

Keywords: *business process redesign, financial services, knowledge-intensive organizations, Lean, XBRL*

1. INTRODUCTION

Accounting firms (in the Netherlands) are under pressure by the market to reduce operational costs, while simultaneously the role of accounting firms in society has never been more important (Accountancynieuws, 2012). Besides, their societal role is being criticized due to the financial crisis and recent scandals, resulting in an increased focus on quality.

Initially, most innovation within accounting firms had already take place during the late nineties (and early 2000s) thanks to the construction and expansion of network infrastructures and the use of new audit software and groupware technology (like Lotus Notes) (Banker and Kao, 2002). Currently, XBRL is an enabler for improving business processes in the financial reporting chain. XBRL is a new standardized business reporting format to communicate financial information (Roohani et al., 2010) with the fundamental idea of allowing a conceptual and physical separation of reporting facts from reporting meta data (Spies, 2010). XBRL thereby offers new possibilities for standardizing and digitalizing financial information used by accounting firms, resulting in a renewed attention for innovation and automation of business processes. The implementation of XBRL into the organization has proven to (be able to) achieve greater efficiency and improved accuracy and reliability (Yang, 2011, Burnett et al., 2006). Only, the slow adoption of XBRL

The increased competition in the accountancy sector resulted in a decrease in turnover and profit for accounting firms. Therefore these organizations have (highly) increased their efforts for achieving efficiency and improving business processes, but are still unsure of how to utilize XBRL for improving their business processes. For these reasons, we have adopted the following research question:

Business Process Management (BPM) is a possible source of inspiration to guide decisions for improving these business processes. It is part of a decades old-tradition for improving the way business people think about and manage their business processes (Harmon, 2010). The central objective of BPM is to enhance business performance by improving organization business processes (Trkman, 2010). BPM has been successful in making organizations leaner, more agile, cost-effective, customer-focused and competitive (Miller et al., 2006). For these reasons, we have adopted the following research question:

H1: Which BPM principles can best be used to improve knowledge-intensive business processes in the financial services industry, for benefiting from the advantages that digitalization and standardization (XBRL) can offer?

However, we are aware which problems can be encountered when applying BPM in the services industry, for instance regarding the availability (and quality) of data or the abilities of measuring process performance (Hsieh et al., 2012, Johannsen et al., 2011). Therefore, the following research question is also included in this research:

H2: Is it possible to provide quantitative validation of the identified process improvements within knowledge-intensive business processes in the financial services industry?

1.1 Methodology & Reading Guide

Following Eisenhardt (1989), case study research is appropriate when existing literature and empirical observations on the subject matter are scarce and research is explorative rather than aimed at testing theories. Because literature on improving knowledge-intensive business processes by the utilization of data-standardization formats in the financial services industry is scarce, a case study research approach is more appropriate for providing initial answers to these research questions.

A mid-four accounting firm in the Netherlands has been chosen as the object of the case study. The firm is viewed as representative for, at least, all (larger) accounting firms focused at SMEs in the Netherlands. For carrying out this case study research, initially the accounting firm and the accountancy domain in general (including relevant aspects of XBRL) were characterized via literature reviews and interviews with business experts. These results are presented in Section 2. This was followed by a literature review for identifying and selecting relevant BPM principles, which is presented in Section 3. Consequently the selected BPM principles were applied to the case study, resulting in numerous specific options for process improvements, which are shown in Section 4. To validate these process improvements a data-analysis and simulation study has been carried out. This was followed by a business expert validation study (survey and discussion). The results of this validation are presented in Section 5 and are followed by a conclusion (Section 6) and discussion (Section 7).

2. THE ACCOUNTING DOMAIN

Accountancy is the process of communicating financial information about a business entity to users such as shareholders and managers, in which the communication is generally in the form of financial statements, which show the monetary terms of the economic resources under the control of management (Elliot and Elliot, 2004). Within accountancy, a distinction can be made between management accounting and financial accounting. While management accounting is intended for internal purposes (management), financial accounting is aimed at providing information to shareholders, creditors, financial analysts and governmental agencies about revenues. Because these stakeholders depend on the reliability of this financial information, accountants have to provide (reasonable) assurance that the financial information is correct, complete and timely. Due to this important societal role, the activities of an accountant are subject to intensive regulation, like the International Financial Reporting Standards (IFRS). In the Netherlands their activities are subject to the "Handleiding Regelgeving Accountancy" (HRA), the Dutch Civil Code and guidelines and acts for the implementation of the Dutch Civil Code. This means that accounting firms are traditionally more focused on quality and reliability, than efficiency.

But not all activities of an accountant are aimed at providing assurance, as a distinction is made between the different types of activities of an accountant. Firstly, there are the assurance engagements, further divided in those providing reasonable assurance and those providing limited assurance. Secondly, there are also non-assurance engagements, which are divided in assurance related engagements and other engagements, like consultancy services or the compilation of a tax return. For the non-assurance engagements, the accountant thus not (strictly speaking) provides assurance, which also means that the applicable regulation for these types of engagements is limited. But still for these non-assurance engagements, the accountant is adding value by his professional expertise and due diligence in the area of financial reporting, and not only because of his expertise in the control area (NBA, 2012). The added value of an accountant is thus to enhance the quality (reliability) of the information provided by the client (or possibly other third party). Also for an assurance related engagement the accountant adds value by issuing a so called Practitioner's Report, stating that the financial statements comply with the applicable standards and reporting framework (NBA, 2012).

1.2 Characterization of accounting firms as service-based organizations

Multiple differences exist between the (more traditional) manufacturing industry and the services industry. An important difference is the intangibility of services in contrast to the tangibility of products. Although accounting firms eventually provide the client with a financial statement and tax return, their added value is the quality enhancement of the information inside the financial statements (and tax return) based on his expertise in financial reporting. The accountant thus offers an intangible product to the client. Intangible products are known to be highly people intensive in production and delivery (Levitt, 1981), as is indeed the case for accounting firms. Moreover, the intangible product can be regarded as an information product as it is heavily based upon data, information and specifically knowledge (Loebbecke, 1999).

Also the high customization degree specific to services (Tyagi, 2011) can be identified in the accounting domain. Fahy et al. (2009) have identified that although there are reasonably homogeneous participants in the financial information supply chain, the clients demand a high degree of data customization. Moreover, this is also deemed to be important in our case study.

A last important characterization of service-based organizations that is also characterizing accounting firms is the difficulty associated with valuing the quality of services (Parasuraman et al., 1985). It turned out that the valuation of the functional service quality (process of delivery) determines the overall service quality to a higher extent than the technical service quality (the quality of the output of the service) (Grönroos, 1983). The case study research also lead to the conclusion that clients of accounting firms have difficulties in valuing the products delivered (the financial statements and tax return), and are likely to be more focused at the responsiveness of the organization when valuing their service. This is also likely due to the high knowledge-intensity of the service, i.e. the specific expertise of the accountants and tax specialists that is almost never questioned and almost never matched by the knowledge of the client.

1.3 XBRL & SBR

XBRL is a derivative of the XML-standard and consists out of specifications, taxonomies, extensions and instance documents. The most important for this research are the taxonomies (and its extensions) and the instance documents. When financial information is tagged with XBRL it forms an instance document. The contents of these instance documents are based on the taxonomies, which namely dictate for a specific financial report which elements it should contain. In the Netherlands the creation of the taxonomies is (largely) coordinated by the Dutch government within the Standard Business Reporting (SBR) program. The Dutch Taxonomy was created containing the most basic information for all types of financial reports. Consequently, multiple granting organizations (the Tax & Customs Administration, the Chambers of Commerce and the Statistics Netherlands) have created extensions unto this base taxonomy. These regulator-specific taxonomy extensions can thus be used for reporting to these specific institutions. Also the taxonomy and its extensions contain XML and

XBRL-specific techniques, specifications and modeling rules for a technical and content-specific (consistency) validation of XBRL instance documents.

3. BUSINESS PROCESS MANAGEMENT

Although different kinds of successes have been achieved with implementing BPM (Miller et al., 2006), literature has also pointed out that even up to a total of 60-80% of initiatives fail (Trkman, 2010). One must choose the right BPM principle(s) for the right situation (Mohammad et al., 2010, Sousa and Voss, 2008). Because scarce literature is written about the conditions under which different BPM principle(s) are effective, the BPM principle(s) to be tested in this research are first selected based upon their likely application to the case study (in section 3.2). Besides, while it is acknowledged that the most value-adding phase of a BPM approach is the act of improving, it is also widely agreed on that this act is lacking guidelines and is poorly supported (Vergidis et al., 2006, Forster, 2006, Gartner, 2005, Reijers and Mansar, 2005, Sharp and McDermott, 2001, Valiris and Glykas, 1999, Gerrits, 1994). This research has therefore also only selected BPM principle(s) offering concrete support for identifying process improvements.

1.4 Selection of BPM principles

Firstly, a number of BPM principles have been selected on basis of their likely applicability in the accounting domain and their concrete support for identifying process improvements. For this quick selection the most frequently used BPM principles have been chosen, namely Total Quality Management (TQM), Total Productive Maintenance (TPM), Six Sigma, Business Process Re-engineering (BPR), Lean and the Theory of Constraints (TOC). Next they have been evaluated according to the criteria, leading to the following table:

Table 1: BPM Principles Evaluation

BPM Principle	*Accounting Domain*	*Concrete Support*	*Chosen?*
TQM	Yes	No	No
TPM	No	Yes	No
Six Sigma	Yes	No	No
BPR	Yes	Reijers and Mansar (2005)	**Yes**
Lean	Yes	Bonaccorsi et al. (2011)	**Yes**
TOC	Yes	Ricketts (2011)	**Yes**

no = likely to be not applicable / no support, yes = likely applicable / reasonable support

For BPR, Lean and TOC specific authors have been chosen who have contributed the concerning principle(s) by clearly stating (and summarizing) the different principles (/applications/heuristics) to be used in identifying process improvements. The reader is referred to the original articles for the exact principles chosen.

4. APPLYING BPM TO CASE STUDY

For the case study research the business process for compiling and submitting financial statements and tax returns is chosen. Due to the fact that this is an assurance related engagement (non-assurance), a more intensive focus on efficiency than with the assurance engagements is possible. The business processes forming the case study are depicted in Figure 1 on page 164, for which the Business Process Modeling Notation (BPMN) has been chosen as modeling language.

1.5 Defining the case study

The case study concerns the sequenced business processes for compiling and submitting the financial statements (FS) as well as the tax returns (TR) for corporate income tax. The first half of the business process is being carried out (mainly) by the accountancy department, with a review of the fiscal position in the FS of a tax specialist. After the FS have been finalized the results are provided to the tax specialists who use this as basis for compiling the TR. The process for compiling the FS consists out of more different steps and takes significantly more time than the compilation of the TR.

The compilation of the FS begins in most cases with a bookkeeping (which is either performed by the client himself or by the accounting firm) begin delivered by the client and a request for the FS and TR (forming the engagement). It is also possible that the client provides the accounting firm with information on paper and that no bookkeeping is available. Consequently the engagement is accepted and prepared, followed by the compilation of the trial balance. Often simultaneously, the information of the administration is manually checked using different instructions of a working program. When these have been performed, the FS are internally reviewed and followed by a review of (and discussion with) the client. Thereafter the FS are revised, finalized and consequently submitted to the client (and to the granting organization which is in this case mostly the Chambers of Commerce). Lastly, the engagement and dossier are finalized after which it is provided to the tax specialists. The tax specialists create the TR on basis of the FS and consequently review (and possibly correct) the TR after which it is sent to the client for being reviewed. When an agreement is received the TR are electronically submitted to the granting organization.

1.6 Defining performance indicators

After the process has been defined and modeled, the performance indicators to measure the current process performance and the influence of improvements had to be defined. In this case it is most important to achieve cost efficiency, followed by a short lead-time and high quality of FS and TR. Customer satisfaction is also deemed to be an important non-monetary benefit, as is mostly the case for services (Rehbehn and Yurdakul, 2005). Also employee satisfaction is important, because their commitment is critical for the implementation of changes.

When quantifying these performance indicators some difficulties were encountered. Although for measuring efficiency the following formula is used: hours made by employee type * salary level, it seemed to be rather impossible to objectively measure if a process was carried out efficiently or non-efficiently. Often in accounting firms, as is the case with most service-based organizations (Hensley and Dobie, 2005, Antony, 2004), accurately measuring process performance receives inadequate attention. Within the case study firm no figures are used to objectively evaluate if business processes are carried out efficiently or non-efficiently. Therefore, while it was possible to create a formula and calculate the direct cost-price (based on time spent by an employee type), it seemed rather impossible to evaluate its efficiency.

Regarding lead-time multiple options are often available in services (Lanser, 2000) which also apply to an accounting firm. There is for instance the possibility of differentiating internal lead-time (only dependent on the company's performance) or total lead-time including the waiting times due to client's involvement with the business process. Because it appeared that in most cases the waiting times due to client's involvement significantly determine the total

lead-time, these are included in the lead-time performance indicator. This makes the waiting-times (for clients) part of the research and are therefore subject to improvements.

Regarding the quantification of the quality of the FS and TR some straight-forward formulas could be defined, like the amount of wrongly reported financial figures (or texts) compared to the total amount. But this gave rise to multiple problems. Firstly, it also appeared in the case study that this was not being measured and could thus not be objectively evaluated (Hensley and Dobie, 2005, Antony, 2004). Secondly, accountants work with the concept of (sampling) materiality, meaning that small (i.e. not material) mistakes are allowed and thus not necessarily corrected. Thirdly, the compilation of FS is (in the Netherlands) regulated by NV COS (4410, part of HRA), which is a principle-based type of regulation and in combination with the high knowledge intensity of the business process this is hampering the possibilities for simply (and purely objectively) distinguishing between wrong or right. Within the business process it is mostly regarded as normal that during reviews significant corrections are made. All these challenges relate to the fact that mostly in services it is hard to define sources of errors and defining procedures for driving them down (Biolos, 2002, Does et al., 2002). Therefore proxies have been created with which at least the added information quality can be subjectively assessed, namely the expertise of the employee working on the engagement, the amount of reviews performed (and the concerning expertise) and lastly the amount of financial figures that have been (sufficiently) checked by the accountant.

Customer satisfaction has been defined according to the opinion of business experts, leading to the identification of cost-price as most important, followed by the time between the end of the client's financial year and the delivery of the FS and TR, the quality of the FS and TR (as perceived by the client) and the total lead-time. Due to the conformity of customer requirements and internal objectives (performance indicators) no direct conflict has to be expected (at first sight) when implementing changes. Regarding employee satisfaction the Job Characteristics Model (Fried and Ferris, 1987) has been used as first identification, followed by expert assessments which eventually led to the identification of challenging tasks (opportunities for knowledge development due to task variety and task depth) as most important. Thereafter, the factors regarding the involvement with the client, autonomy and task identity are ranked next important.

Moreover, the most important constraint seemed to be that there should always be the possibility of customizing the entire product according to the wishes of the client. This appears to have a major influence on the assessment of process improvements.

1.7 Data Collection & Simulation

The previous paragraph has already explained some challenges due to the inadequate attention of measuring process performance. Some challenges were also encountered regarding data collection and analysis, which serve as input for the simulation study. But first it has to be noted that, in contrast to most other service-based organizations (like explained by Antony et al. (2007), Hensley and Dobie (2005) and Hagaland (2005), data was sufficiently available and reasonably easy to collect (and combine), due to the existence of an hour-registration and electronic file application including a database which contained numerous client- & engagement-details.

Only, it appeared that mostly the quality of the data, from the hour-registration, was reasonably low (incomplete, inconsistent, invalid, not entirely accurate), like mostly in services (Does et al., 2002). This is because employees all had their own way of registering their hours, often used the wrong identifiers, often did not included a description and often did not registered their hours as fully reflecting reality (for instance registering one activity as multiple). Also the data from the hour-registration and electronic file application were inconsistently stored, hampering the possibilities for their integration. These problems hampered the possibilities for adequate statistical analysis, moreover it was almost impossible to define correct process times for certain activities (and their order).

Therefore interviews were used to manually collect data, but this gave rise to another problem. For accounting firms the extent of an engagement, the amount of employees needed, the processing times and the process set-up is heavily dependent on several factors. The most important reason for this is the large variety and diversity of customers (types) and a plurality of customer characteristics which are hard to quantify, as is also mentioned by Does et al. (2002). Moreover, due to having a people-intensive business process, variability is also engendered by human behavioral characteristics and preferences of the employees (Does et al., 2002) and a service-based attitude of employees resulting in higher customization of services (Antony, 2004).

These challenges hampered the possibilities for creating a sufficiently detailed and valid simulation model. But still, a simulation model has been created using flow-oriented DEVS in Arena and an animation has been created based on BPMN modeling. Some large simplifications had to be made resulting in fewer opportunities for the model to be used for testing process improvements and no causal relations could be incorporated regarding efficiency and quality. This meant that the simulation model was actually limited to testing the lead-time and the efficiency solely based on the removal or addition of tasks, having no causal relationship with the other performance indicators. The model was validated using a face validation of business experts and the validity of some outcomes of the simulation model (efficiency per engagement of customer type, total lead-time, internal lead-time, and internal waiting-times for possible constraints).

1.8 Identified Improvements

Consequently the articles defined in table 1 were used to identify process improvements purely on the basis of reasoning based upon this literature. This lead to the identification of 35 possible process improvements as located in the process model of Figure 1 on the following page. This figure also shows the numbers of the different process improvements, which are identified using one (or a combination of) principles from BPR, Lean and TOC, which refer to the table below the figure.

5. VALIDATION OF IDENTIFIED IMPROVEMENTS

The identified process improvements (as shown in the table on the following page) were consequently validated by largely using a business expert assessment (and partly using the simulation model). The following paragraphs present these assessments, for clarity issues all BPM principles have been underlined and the improvement numbers are made *italic*. The order in which the process improvements are discussed is (largely) by following the order in which they are mentioned in the table.

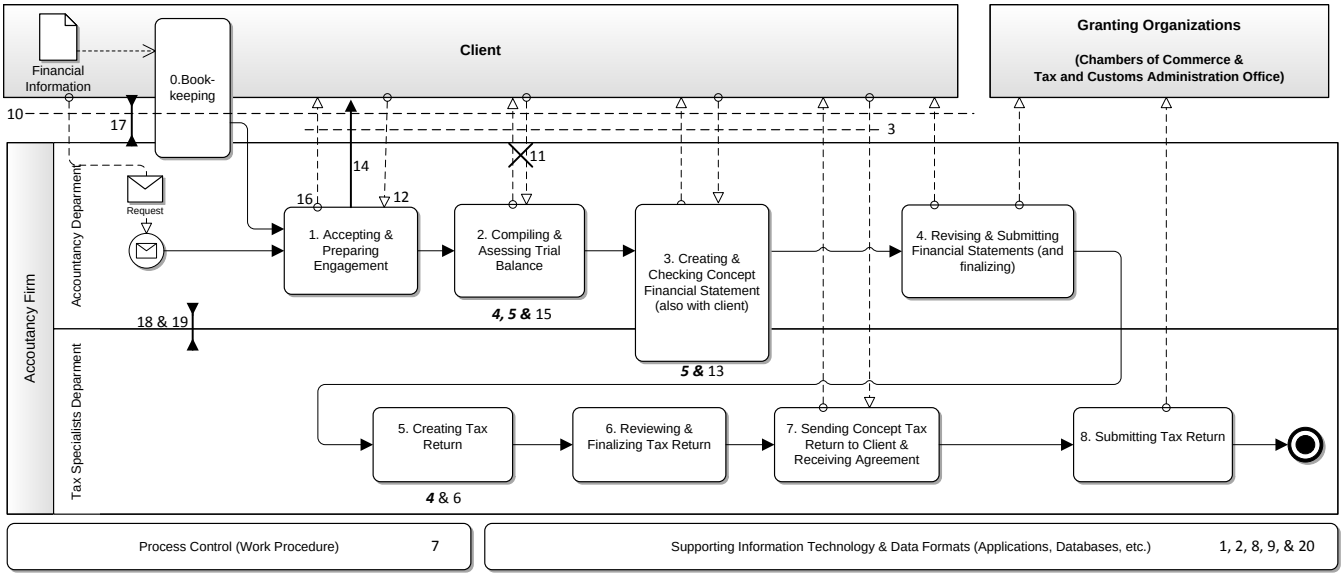

Figure 1: Simplified Overview of Business Processes (improvements 4 and 5 are affecting multiple sub processes)

Table 2: Process Improvements and their Source

Hypothesis	Improvement Nr.		
BPR: Task elimination & Lean	1*	2*	3
	4	5	6
	7	8	9
BPR: Integral Technology & Centralization	1*		
BPR: Interfacing	10		
BPR: Contact Reduction	11		
BPR: Control Addition	12	13*	
BPR: Control Relocation	14	15	
BPR: Buffering	16		
BPR: Integration	17	18*	
BPR: Parallelism	18*		
BPR: Numerical Involvement	19		
BPR: Task automation	2	13*	20

** = had multiple BPM principles as source*

Firstly, Theory of Constraints and some of the BPR principles did not lead to an identification of a possible process improvement related to digitalization or standardization (using XBRL) and are therefore now shown in the table.

1.9 Digitalization

Task elimination has been unified with Lean as the latter is more specific in which tasks or activities should be eliminated or prevented. Lean firstly helped to identify the waste that exists due to employees searching for hardcopy documents (*1*), because they are not knowing the exact location and or responsible employees of these documents. The integral technology (and special variant centralization) pointed out that therefore all documents should be electronically archived and accessible for the concerning employees, in this way all employees have access to all needed information regardless of their own location and that of the documents (*1*). For the case study this meant that every by the client provided, but moreover also every by the accounting firm compiled, document should be stored digitally in the digital file application. This will have a slight positive affect on all identified performance indicators.

1.10 Improving (dependency on) response time of clients

Lean also led to the identification that it is very important to reduce waiting-times for clients (*3*). These waiting-times namely (mostly) significantly determine the total lead-time. Moreover, poorly responding customers seriously disturb the compilations of other engagements. Consequently, the interfacing principle further defines how these waiting-times can be reduced, namely by using a standardized interface. In the accounting domain a newer trend is the use of a client portal (10), which can be used to exchange information and documents, but it also provides opportunities for letting the client approve XBRL instance documents of a FS or TR. Only it is not likely to have a significant influence on the response time of clients, but it will be slightly more efficient.

It also appeared to be a significant improvement when it would never be needed to request additional information during compilation (contact reduction: *11)*, which is sub process 2. This is because of two reasons, firstly it introduces another waiting-time for clients (also Lean: *2)* increasing lead-time of the business process. Secondly, with hindsight, it means that work is performed on basis of incomplete information (*Lean: 4*), which significantly decreases the efficiency. An improvement that can be implemented to reduce the likelihood (still not completely) of having incomplete information is to carry out a more intensive check on the received information (control addition: *12*). Also when the customer is held more responsible for delivering complete information (control relocation: *14*) and is thus requested to perform this check himself (manually), it could reduce this likelihood. But this is negatively affecting customer satisfaction, meaning that an additional client-incentive should be included. But digitalization in general and XBRL specific can also significantly reduce this likelihood, namely in the case when an *electronic* administration is provided by the client. When an electronic administration is received, the accountants can namely carry out an automated completeness- and reconciliation check incorporated in the administration application to check if the administration is complete. These checks still require some manual implementation, as the administration has to be

mapped in the administration application. But when an administration is provided with XBRL-tags, this check will only require a one-time set-up for all possible administrations. The results of these checks can consequently be used to give the client the possibility to supplement or correct his administration. This is consequently also a relocation of a control, but then automated (15).

Besides, requesting information more often than once in the year (buffering: *16*) can also slightly reduce the likelihood of having to request additional information during compilation. A more significant improvement would be an integration with the administration process of the company (*17*) because this will significantly decrease likelihood of having incomplete information. But integration will also directly make the process more efficient and shorter and will also help to increase quality and employee satisfaction. This is because the accountant has full access to the administration during the entire (financial) year and can thus carry out checks on any given moment and is thereby more involved with the client. Currently, his is only (partly) possible by letting the client use a Software-as-a-Service (SaaS) application for their administration. But most (larger) clients have their own administration application (and Enterprise Resource Planning systems), meaning that they cannot simply use a SaaS application for their administration. But in the far future when XBRL GL is developed this can be successfully implemented, resulting in a significant improvement for all stakeholders and performance indicators.

1.11 Company internal integration of business processes

In addition, besides the integration with business processes of third parties this hypothesis can be changed to a company internal integration of business processes. The business process of the accountancy and that of the tax specialist can namely be regarded as also having a provider/client relationship. This means that these two business processes can be integrated and thus run in parallel (*18*). This is possible, because after sub process 2 there is no causal restriction for sequenced activities. Moreover, due to the digitalization and standardization of the financial information with XBRL (and SBR) made it much easier to share financial information between different departments and disciplines. This is a significant improvement for the total lead-time of the two business processes and is also increasing efficiency and quality due to the processing of shared information. Moreover this indirectly also means an increase in customer satisfaction (due to the large conformance of internal and customer indicators) and an increase in employee satisfaction.

However, there are some disadvantages related to this company internal integration. Lean namely helps to identify possible problems that (can) arise due to working with concept information (*4*). If the business processes are namely run in parallel / integrated, the compilation of the TR is performed using non-finalized financial figures. However, it appeared that final information is rarely changed in the case study, thus not hampering the possibility of this integration. Furthermore, the numerical involvement principle also immediately makes clear the increased coordination efforts needed to structure this integrated business process (*19*), which is a significant problem. Electronic assistance in the planning of activities (using a digital file application or by using an ERP system) can decrease the efforts needed to coordinate activities between the two different departments.

1.12 Improving quality of information products

Lean also helped to identify problems because data is manually re-entered, sometimes resulting in data entry errors, meaning a decrease in efficiency when they have to be corrected (and possibly a decrease in quality when an error went unnoticed). Moreover manually re-entering information is not (always) needed, as task automation makes clear that automatic transport of data is possible (*2*). When XBRL is implemented, this transport can be improved, as the meaning of every individual item is fixed and thus evident. Task automation furthermore made it clear that more automation possibilities exist which are not always being used (*also 2*), thus resulting in Lean waste. Existing software functionalities can also be used to automate more checks of the financial administration (*20*), resulting in a significant increase in efficiency, only significant problems then exist with the employee satisfaction. They should consequently acquire new responsibilities to achieve enough task depth. In addition, control addition can be combined with task automation to add an automated validation checks in the end of the business process (*13*), which will have a slightly positive influence on all indicators. When XBRL is implemented and XBRL Formula Linkbase is available, it is easier to implement these validation checks. Moreover, following Lean, this check should be able to be carried out by the employee himself, which allow the employee to improve the FS or TR before it is being put up for review.

Lean also pointed out that time spent on making corrections is waste *(5&6)*, but improving this situation is dealing with some problems. Although, slight improvements could be made when automated transports (possibly using XBRL) are used (*2*), there would still be a large part of corrections needed. The automated completeness- and reconciliation checks, together with the validation checks are also likely to decrease the amount of corrections needed in the end of the business process. But as explained in section 4.2 mistakes within the business process are implicitly accepted and regarded as normal, among others due to the high knowledge intensity of the business process. Although it would mean an improvement to prevent this from happening, no significant solution is identified.

1.13 Standardization

Besides, Lean pointed out the advantages achieved by standardizing activities (*7*) and data formats (*8*), of which the latter is possible (and boosted) due to XBRL and SBR. This encountered some problems for the accounting domain due to the large variety and diversity of clients (characteristics) and the high degree of process and data customization (content). Although there is a possible significant increase in efficiency when standardizing data formats (*8*), significant hurdles exist due to the large variety of customers and content are currently too big to overcome. It should be possible to standardize a part of the clients, but future research should point out how many can be standardized. Moreover, the employees value their autonomy and a service-based attitude significantly, leading to a negative assessment of standardizing activities by (strictly) following a predefined procedure (*7*).

Lastly, Lean (a kind of duplication waste) also helped to identify the advantages of minimizing the amount of software applications used (*9*), when used software applications can also be expanded with functionalities of another used application, such that no longer two different applications are needed. This development is boosted by XBRL and SBR, namely leading software developers to expand their functionalities to a multi-purpose application. This also aligns with the 'store once-report many' concept of XBRL and results in slightly more efficiency and quality (only one application have to

be grasped, no (manual) transport or transformation of data needed).

6. CONCLUSIONS

In this paper it has been researched which BPM principles can best be used to improve knowledge-intensive business processes in the financial services industry for benefiting from the advantages of digitalization and standardization (XBRL). A single case-study firm was used to derive improvements using BPM principles and to assess these improvements. The case study research was unfortunately limited to qualitative research due to some identified characteristics of an accounting firm.

Firstly, the Theory of Constraints was not very suitable for guiding decisions regarding the utilization of XBRL in the business process. Secondly, Lean was very helpful in identifying problems (mostly as a specification of task elimination) existing in the business process, but for most cases its solution was consequently provided by another BPR principle. Thereby BPR was offering more concrete support for improving the process. Besides, the BPR principles concerning the interaction with customers, the information and task automation appeared to be most helpful.

The BPR principles of task automation, control addition and control relocation together with the Lean principles for the reduction of defects, incorrect inventory and waiting waste are the BPM principles leading to significant improvements. Mostly they can all already be implemented using existing software functionalities. But these can lead to more significant improvements and be easier/more successfully implemented when XBRL is used.

Currently, existing software applications can already be used to integrate with the administration (process) of the client. This can offer significant improvements, but give rise to some problems. When in the future XBRL GL is developed, this integration can be implemented without any disadvantage. Moreover, the integration (and parallelism) hypothesis of BPR can be expanded with a company-internal variant and result in a significant improvement. This possibility is largely created by the opportunities raised due to XBRL and SBR, but only increases the complexity of the business process and the coordination efforts needed between the two different departments. There is also a contrast between an efficient and Lean process using standardization (XBRL and SBR) and an accounting firm having to deal with a large variety and diversity of client characteristics and a high degree of process and data customization. Some standardization should be possible, but future research should point out how an optimal balanced solution can be identified. Thus, the principles of BPR regarding integration and parallelism and the Lean principles for a reduction of variation and duplication waste are the ones most specific to the implementation of XBRL.

Above all, for answering the second research question it can be concluded that applying BPM to the accounting domain with the current conditions should mainly be based upon qualitative research and techniques, as it is extremely hard to provide real quantitative results/evidence for the support of decisions and project selection. Another possibility is to manually collect data by observing the execution of the business process.

7. LIMITATIONS AND FUTURE RESEARCH

Firstly, this research only researched the applicability of BPR, Lean (for Services) and Theory of Constraints as BPM principles and after a short analysis disregarded others. Thus, other BPM principles still have to be researched. Moreover, of BPR the extra resources, outsourcing and flexible assignment principles have not been researched/assessed and future research could point out any possible advantages of these principles.

Secondly, the research was limited to qualitative research although originally aimed at providing quantitative validation of process improvements. Future research should therefore be aimed at creating a model of measurable performance indicators to assess the efficiency and quality of business processes in the accounting domain. Statistical analysis revealed that the amount of companies of a client and the amount of general ledger accounts have a large influence on the total time spent on an engagement. Other indicators should be added to further define client complexity. The line of industry of the companies and the maturity of the organization in its bookkeeping are other likely indicators for client complexity.

Moreover, future research should be able to quantify the quality of the FS and TR, and how to design an adequate measurement system for quality using the in the research identified proxies as guidance. One could for instance include a code in the hour-registration for making corrections within the business process and after the FS and TR have been discussed with the client (sub processes 2 and 3). In the future, any included validation checks of XBRL instance documents could also point out the quality of an FS and TR and its results could be stored such that it can consequently be assessed and compared.

Future research should also point out how hour-registrations can be improved and how its correct registration by employees can be encouraged and/or obliged within any service-based organization. This will increase the quality of the information and will significantly increase its usability for statistical analysis.

Lastly, this research is based upon a single case study analysis for deriving improvement options and to validate these process improvements. Although it seemed from multiple business-professional sources that the set-up of most accounting firms is the same and the case study can thus be regarded as representative for (at least) all other accounting firms aimed at SMEs. It is likely that it can also be regarded as representative for accounting firms aimed at large-scale industry, but future research should be carried out to decide how representative the case study company really is.

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