Implementing a business process management system applying Agile development methodology: A real-world case study

by

Gongyao Zheng

(student number 303669)

supervised by

Dr.ir. Rob Mersel

Thesis

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Introduction

Today's companies do not only need to do more than ever before, they need to do it all faster and better, preferably with lower costs and higher ROI. Furthermore, in order to preserve the competitive advantage and to face the quickly increasing global competition, "companies must continuously implement the best practice management principles, strategies and technologies" (Carpinetti et al., 2003). One of the best practice management principles is Business Process Management (BPM) (Kilmann, 1995).

Business Process Management (BPM) is an approach to improve and to optimize business processes, aiming to contribute company's enterprise value and performance. The concept of using business processes to improve efficiencies and effectiveness of an organization has been around for a long time (Pritchard & Armistead, 1999), BPM becomes "a boundary less approach to modern competitiveness" (Zairi, 1997).According to historical researches, "a prerequisite for managing an organization based on its processes is to know which business processes are performed within the organization and how they are related to each other. Hence, a process-oriented firm explicitly designs and documents its business processes" (processorientation.com, 2009). For this reason, the companies are improving and controlling processes more seriously.

With such a setting, the largest drinking water company in the Netherlands Vitens n.v. started in 2008 a series of BPM programs designed to turn the company from a traditional department-based company into a modern process-oriented company. One of projects is to implement a BPMS (business process management system) for its core process Customer Registration. This project describes, analyzes, improves and automates the

process of Vitens, aims to ensure optimization of processes and help to setting up a process-oriented organization.

With a traditional BPM project, the skills and development needed to implement limits the ability to respond quickly to changes (Simmons et al., 2012). Pair this with a gap/delay between business and Information Technologies (IT) as well as the lack of involvement of the users/process-owner/process-expert, it could easily result in loose collaboration, extended development time and budget surplus.

Within the project, an approach called Agile development methodology is applied intent on shifting up development cycle and tightening up collaboration between participants. The objective of this paper is to examine how far the Agile development methodology may serve as a proper methodological approach in a complex BPM implementation project by analyzing the implementation of the whole project and the impact on the organization. It is hoped that the study can reveal some of the major issues regarding BPMS implementation by applying Agile development methodology.

In this paper, I start presenting some background of Business Process Management (BPM) and explain why BPM should be applied. After that, an introduction is given about the Agile development methodology to explain its key elements in detail. In the following, continuing in my paper I describe the project environment. And it follows by a detailed, phased approach analysis for implementing the BPMS project. Finally, I point out some lessons learned which are found in the project regarding the approach and conclude with a summary.

Table of content

Research methodology

Research type and strategy

This chapter of research methodology will present the whole research process of the thesis. A descriptive research method will be adopted to describe and analyze the design and the implementation of the BPMS project by applying the Agile development methodology.

Despite that secondary research is normally used in a descriptive research to collate and synthesize existing researches, in this paper, the primary research provide main data for analysis through direct observation and involvement in the project, some project participants will be interviewed and information of project evaluation at the end of the project will also be useful.

Some researchers (Flyvbjerg, 2006) argue that “qualitative methods and case study research may be used both for hypotheses-testing and for generalizing beyond the particular cases studied”. In this context, a case study of a BPMS implementation project of a specific business process in a utilities industry will be defined as the research strategy. In addition, qualitative research will be used in the research which is “one of the most common methods of performing qualitative analysis in the field” (Orlikowski & Baroudim 1991; Alavi & Carlson 1992), intends to illustrate in-depth reasons of a certain phenomenon, which focus on why and how.

Research scope

While there is more than 1 process ongoing for BPMS implementation project inside Vitens, in this paper, the research scope is restricted to the BPMS implementation of process Customer Registration of department

Customer & Billing. For all that, however, it still would be interesting to determine if Agile methodology would suit the BPMS implementation of other processes inside the Vitens. It would also be a very useful contribution to research what kinds of situational factors are critical for success Agile project which is necessary to analyze the case on the conclusions and statements about repeatability and generability.

Research question

To provide in-depth analysis of the case research the following research question was formulated:

Does Agile development methodology suit the business and IT needs of the Business Process Management System implementation project for Vitens' core process Customer Registration?

To answer this question, the following research questions were formulated:

- *What is Business Process Management System and what kinds of benefits can Vitens gain by applying it?*
- *Can Agile approach be used to implement an BPMS project and what are the characteristics of this approach?*
- *How is the project Vitens' core process Customer Registration implemented by using the Agile methodology?*

When all these research questions are answered, a conclusion can be drawn based on findings from the project implementation by analyzing the success criteria of Agile project. Concluding remarks will be made if and under which circumstances, an Agile approach to BPMS-projects can be applied for other processes at Vitens and outside of Vitens.

Business Process Management (System)

The process is the basic unit of business value within an organization, processes are connected to produce customer value, they are flows to convert inputs into outputs in such way that the resources of an organization are used with its operations to achieve its goals.

In that light processes are organizational activities which across traditional functional boundaries, many organizations “have recognized the need to move away from the traditional functionally-based approach to managing through a set of clearly defined customer-driven processes” (Zairi 1997), which corroborated the results of increasing attention of business owners towards BPMS. A recent survey of Gartner showed that the BPMS (business process management suite) market size in 2009 was valued at $1.9 billion growing to $3.4 billion by 2014(Gartner Inc., 2011).

By contrast, although the importance of BPM is widely recognized, BPM sometimes seems to have as many different meanings. Some definitions emphasize the continuously improvement of business processes (Zairi 1997), while others pay attention of using methods, techniques, and software supporting business processes (Van der Aalst et al. 2003).

As a synthesis, the definition of a business process management used throughout this paper is: an approach to improve and optimize business processes continuously, aiming to contribute company's enterprise value and performance.

> *BPMS is "a (suite of) software application(s) that enable the modeling, execution, technical and operational monitoring, and user representation of business processes and rules, based on integration of*

both existing and new information systems functionality that is orchestrated and integrated via services" (Ravesteyn and Versendaal,2007).

In simpler terms, BPMS is a software that supports and implements the BPM approach.

Previous researches on academic and professional journals have made some great contributions to the necessities of BPM(S) (Van der Aalst et al. 2003, Weske et al. 2004, Karagiannis, 1995, Ravesteyn & Versendaal, 2007). They argued why organizations should start BPM(S) projects and provided many benefits of BPM(S) which could help an organization to be efficient, effective and capable of changing, it includes:

- Improve process quality
- Meet customers' requirements, improve customer satisfaction
- Engender continuous process improvement
- Improve the customer experience
- Improve business agility
- Reduce process cycle time and costs
- Reduce inefficiencies and errors

The Agile methodology

Approaches to BPM

Many organizations have seen the benefits which BPM can provide, it may result in a significant advantage for the organizations applying them, however, implementation of a business process management systems (BPMS) can be complex and time-consuming. It also requires a tighter alignment and extensive collaboration between business and IT. During the implementation project a proper methodology must be considered to support and to ensure that the goals can be achieved. Fortunately, literatures on business process management suggest that great efforts have been done in the field of methods for BPM implementation. Ravesteyn (2007) listed 21 BPM (-related) implementation methods (appendix 1) from professional and academic world. One of these methods has emerged in the last decade: Agile software development methodology (The Agile methodology).

When we talk about software development methods, is it easy to recognize the waterfall model, which is a traditional approach. Traditional approach consists of "...sequential phases of planning, analysis, design, implementation and maintenance. The approach involves detailed requirements gathering, followed by a design which includes all specifications. Development then proceeds according to the plan." (Vinekar2006). Thus it often has a long development cycle. A lack of responsiveness to change is another issue of traditional sequential development. Requirements often change after a project begins, and process owners often change their expectations for the desired process during the project implementation phase. The developers and other

participators need time to respond towards the changing requirements, but it takes time and can be costly, the project could hence fail to deliver on time and on budget. If the project is going to fail, it is much better to know after 1 week rather than after 3 months. Additionally, the lack of involvement of the users creates a gap between business and Information Technologies (IT), where business claims that IT does not understand the business processes, and conversely.

Within this content, the Agile methodology is developed to overcome the weaknesses of plan-based methods of software development. Given the true natures of BPMS project which emphasizes collaboration between IT and business as well as rapid response to change, BPMS implementation project is the ideal candidate to apply the Agile methodology.

The Agile methodology

Agile software development is a framework of a group of software development methods for software development project management as well as solution implementation, with principles of iterative and incremental development, continuous testing, and frequent re-planning based on current reality where requirements and solutions evolve through highly collaboration between self-organizing, cross-functional teams.

The Agile methodology favors the need for flexibility and adaptability of the organization (Highsmith, 2002), it allows business and IT to work together on design in terms of desired processes which could result in a quick quality solution, it helps customers to achieve dramatic business results by accelerating time-to-market (Simmons and Steele, 2012). Other benefits of leveraging this methodology include cost savings, risk reduction, and greater customer satisfaction by promoting a focus on customer needs

(Ambily O.A et al., 2011). Because of the adaptability of the methodology, customers' demands of change in plans or requirements can often be realized in the next iteration of development. Agile methodology also allows organizations to respond to the unpredictability of a project (Simmons and Steele, 2012). Because the design stage is not formal and developers work in short iterations, significant requirements can be changed without much loss of productivity.

There are several methods under the agile framework, some methods focus on project management and collaboration practices, while others focus on software development practices. Scrum is one good example of the first kind.

Scrum

Scrum is a discipline used to manage project and to stimulate collaboration using iterative, incremental practices. Within the Scrum discipline, a series of iterations are used as basic units in the project. In the end of one iteration, a working piece of software will be delivered and can be tested, which generally results in a BPMS implementation that one iteration comprises one or more processes of the project or one process if the project is complex enough. A key benefit of iterative development is that, a deliverable developed during an iteration can be directly tested by the end users at the end of the iteration.

Team

In an Agile project, the teams are cross-functional (Boehm, 2002). The customers (business) usually will join the development team, they normally take responsibility to form the requirements of functionalities and to test the deliverable within an iteration without to taking the existing corporate

hierarchy of an organization into account.

In addition, a face-to-face communication is preferred to written documents within an Agile project (Agile Manifesto, 2001),. It propagates that all team members should locate in the same location. Since the team size is typically small, excellent team communication and team collaboration will be easily realized. So that a regular feedback from the end users can be given quickly en implemented afterwards as soon as possible.

Testing

The major distinction of Agile from traditional methods about testing is that testing is handled at a different stage of the software development lifecycle. Traditional methods encourage testing after complete system development or after a mature part of completion. Despite that Agile also executes testing after development, the most of testing is done directly after a minor part of software delivered during an iteration.

In Agile, testing is involved and accomplished by all members of the team to validate the client requirements at frequent intervals. As soon as possible one sub-process is build or any bugs are fixed, they can begin to test and give feedback quickly. Under such a scheme, potential bugs are early detected and fixed, it will further help to reduce the cycle time and the cost of development.

Iterations

Since Agile methodology promotes adaptive planning (Highsmith, 2002), a BPMS implementation project who applied Agile methodology, has often minimal planning. Although iterations are typically short, a full software development cycle is fulfilled during one iteration, including planning,

analysis, design, coding, testing. This decreases the project risk and allows rapid changes when it is desired.

BPM cycle

Bottlenecks in processes are often clearly identifiable but how do we improve the current chain and transform the focus of the ad hoc response to an organization that goes for continuous optimization? This can be done by means of the BPM cycle (figure 1).

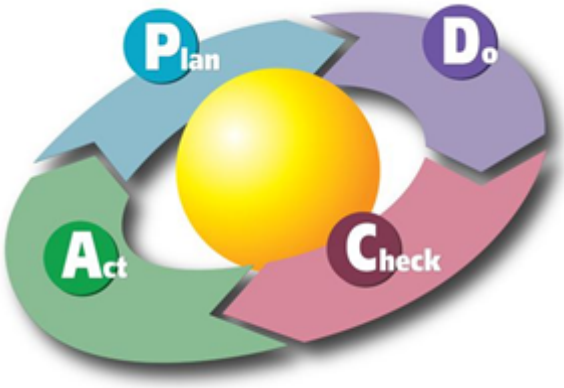

Figure 1: BPM cycle

This cycle is called plan-do-check-act cycle, in which a process is performed based on a plan (with goals, coupled with the strategy of the organization). There is a regular 'check' on the basis of measurements and evaluations. When unwanted deviations are found that differ from the plan and the strategy, an 'act' adjustments will be implemented in order to correct it. Then the cycle begins again with 'Plan' to initialize process improvement so that the quality of the process always improves. Consequently, the BPM cycle is a learning curve within the organization in which people remain critical and constantly look at where quality can be increased.

Success criteria of Agile project

Based on existing literature, there are a number of articles describing empirical studies related to the Agile methodology. Wan and Wang (2012) verify critical success factors (CSF) in their empirical case study, while Schatz and Abdelshafi (2005) provide results from the Primavera case study

indicating how to measure success in an Agile project. Chow and Cao (2007) indentify 12 critical success factors of Agile software development projects using quantitative methods by gathering survey data from 109 Agile projects. They define CSF's as "the factors that must be present for the Agile project to be successful" Chow and Cao (2007).

Besides these case studies, other findings are based on quantitative researches. In the systematic review of Dybå and Dingsøyr (2008), they evaluate, synthesize, and present the empirical findings on Agile software development. This is further detailed by Misra et al.(2009), who conducted the CSF's into three categories: time, cost, and quality, which can be recognized as competitive criteria for software development project.

In an Agile environment, it's often difficult to measure the success since Agile welcomes changing requirements. However, Misra et al. (2009) proposed five criteria used to determine the success of Agile software development project, which the most critical success factors can be categorized into any of them:

- Reduced delivery schedules.
- Increased return on investment (ROI).
- Increased ability to meet with the current customer requirements.
- Increased flexibility to meet with the changing customer requirements.
- Improved business processes.

These criteria summarize the three important angles of the success of Agile project. Based on these criteria, the outcomes of the project are used to validate whether the project is successfully implemented adopting Agile methodology.

Project

Company

A number of mergers have resulted in Vitens being the largest drinking water company in the Netherlands. They supply drinking water to provinces of Friesland, Overijssel, Flevoland, Gelderland and Utrecht, as well as a number of municipalities in Noord-Holland and Drenthe.

The company has a vision (Vitens, 2012). it wants to be a leading drink water company delivering reliable drinking water and continuously supplying against lowest possible costs. In order to achieve this, it is important that the company has efficient processes, which ties to the business process management.

Objective BPMS project

The department Customer & Billing of Vitens wants to improve the service quality and efficiency of operations constantly resulting in better customer satisfaction and lower cost per connection of water. This is why the department started in 2008 with Business Process Management (BPM) . This project is a part of the roadmap for the department Customer & Billing aiming to reduce cost and to accomplish customer-oriented approach. This project is aimed at analyzing and optimizing processes so that processes can be more manageable, other strategic benefits of the department wish for through this project follow:

- From functional task-oriented to process-oriented (figure 2)
- Continuous improve processes and increase quality of customer contact
- Optimization between process and operation

- Reduce transfer times of work
- Multi employability (reduction of FTE)

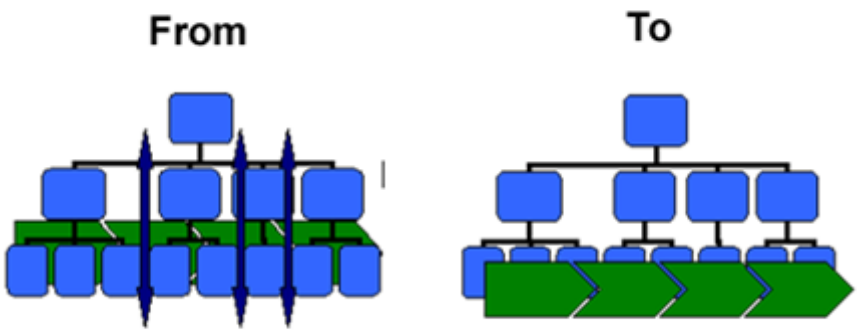

Figure 2: From functional task-oriented to process-oriented

Scope

The goal of this project is to implement a Business Process Management System (BPMS) supported by a BPMS software suite named IBM Business Process Manager. As described in (figure 3), the project consists of 3 phases, namely Customer Registration and Cancelation, Customers Relationship Management and Usage, Invoicing & Cash Collection. In this paper, we focus on the Customer Registration Process.

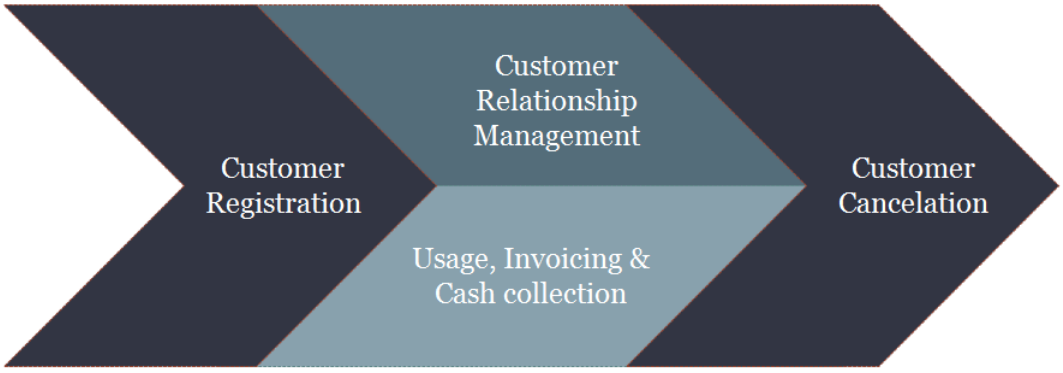

Figure 3: Project scope

This project is done by applying Agile methodology in which the demands/ wishes, process modeling and testing are intermingled. By means of this methodology, the business requirements and system dependencies can be

aligned.

This paper describes only one process, namely Customer Registration of department Customer & Billing of Vitens, which is one of the key processes of the BPMS implementation project. The project is initialed by department Customer & Billing of Vitens aimed at analyzing and optimizing processes for more manageable processes.

During the project, a process team is created. These process team members are the key users of the BPMS. During the project implementation phase, if the current activity or process must be adjusted, the process team members are those that describe, request and test the changes. They will be part of the project to cooperate with the developers, business analysts en project managers. When the project is completed, they are able to support and train end-users.

Some responsibilities of process teams are shown below:

- Analyze current processes
- Responsible for documentation, work instructions, KPIs, process measurements, etc.
- Initialize improvements proposals (business case)
- Initialize new process design (BPR)
- Monitor Processes
- Manage process documentation
- Communicate process changes

Moreover, these process team members are responsible for testing together with some future end-users. At the end of project, built functionalities will be tested by them through acceptance testing. By approving the outcome of this test and the test underlying test scripts, the acceptance will take place.

As-is (previous situation)

The following list summarizes the issues of the previous situation inside Vitens concerning business process:

- Business
    1. High labor cost to execute activity
    2. Inconsistency of work quality between workers
    3. Inaccurate prediction of work completion
    4. Difficult to give status reports
    5. Failure to effectively manage process and performance
    6. Informal tasks and communication (lots of paper and email)
    7. Incomplete or inaccurate data flow between systems
    8. Insufficient understanding of the performance of the process
- IT
    1. Frequent change requests to deal with exceptions in the process
    2. Frustration about the constant changes in business requirements
    3. Press to shorten the development cycle
    4. It is not possible to keep the speed of change

Considering the Customer Registration Process, for example, a new customer with a new connection, which may involve execution of transactions such as customer registration, creating a new connection, registration of the new customer on the newly created connection and generation billing document in an ERP system. In practice, these four transactions may be performed by four different workers from Customer Service, Connections, Customer Moving and Accounts department respectively. ERP systems obviate the need for duplicate data entry, however, they never alert Department Connections that the previous activity has been completed and it is their turn to complete the transaction when

Customer Service has handled the call from customer. As a result workers are needed to be prompted externally (manual intervention) to accomplish these tasks/activities assigned.

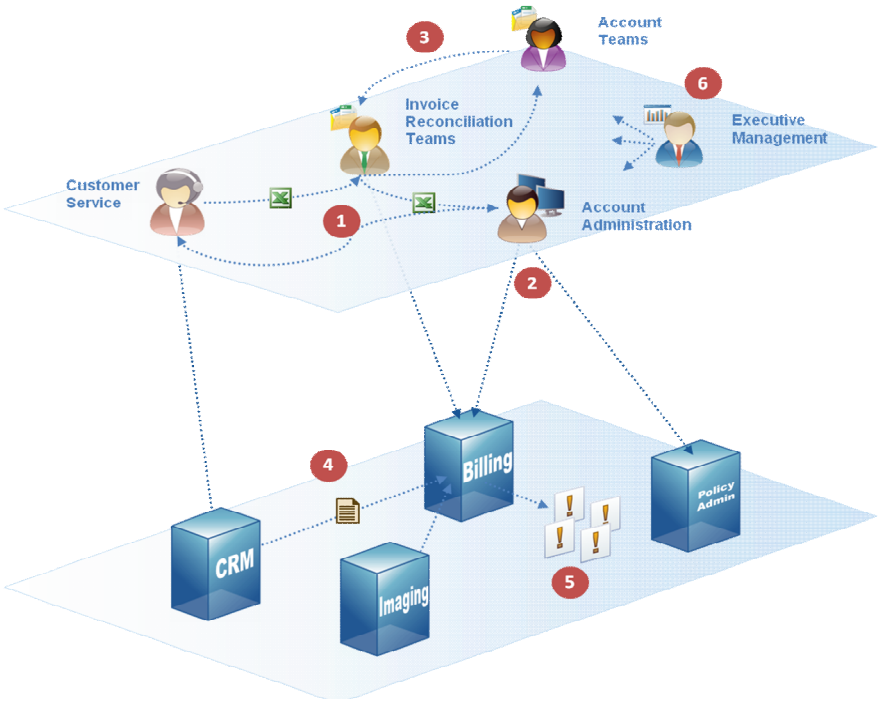

Figure 4: previous situation

An activity of a business process executed in a "non BPMS" environment is neither visible to activity owner nor to their manager. As stated above, workers of Department Connections do not know when work gets assigned to them to create a new connection, and also the priority and deadline of that work.

Analogously, process manager is not aware of the bottlenecks, delays, exceptions, etc, process manager thus tend to be reactive.

To-Be (desired situation)

Figure 5 illustrates the desired situation by using BPMS which:

- Automatically routes and prioritizes work
- Helps and guides users in making decisions
- Provides a standardizing of solving problems
- Automates some activities
- Offers real-time visibility and control of processes

As stated before, by identifying and documenting business process, a clear detail of the business process could be revealed. Based on documentation

obtained from the analysis, the Business Analyst start drawing up the desired process diagrams together with process teams of Vitens. With the aid of an appropriate modeling of the business processes, the essentials of the processes can be understood. It is ideal that the model of processes can be understood as much as possible by the people involved in the project, in particular the business. This could be achieved through the use of graphical representations of the process. Appendix 2 shows the model of the desired situation for Customer Registration Process by using Business Process Model and Notation (BPMN).

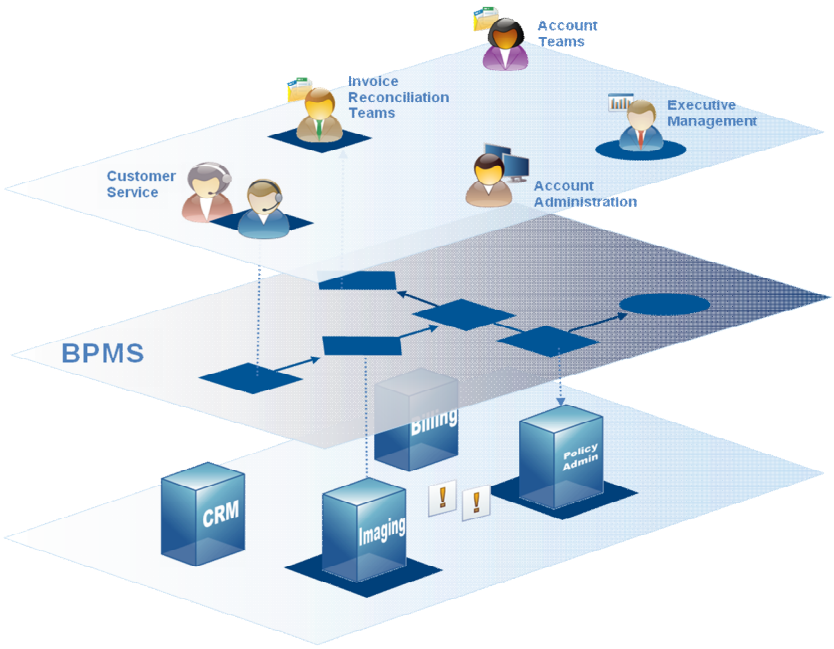

Figure 5: desired situation

Process teams

By identifying process, workers will get a better insight into their work. This ensures uniformity in the workplace and will bring problems to light easier. Moreover, since the most processes are cross-department, therefore it offers an improved communication between different departments. The idea is that it is more efficient for all activities to act correctly at once. This saves the organization time for corrections. This kind of organization will eventually save money. It is thus important to do the right things at the first time.

In addition to identifying processes, it is necessary to actually do something with these processes. It is envisaged that the work must be initiated inside Vitens from process perspective and thus it leads to improvements of the processes. The philosophy is that this can best be done by the people who are daily engaged in carrying out the activities of the processes. Therefore, process team is created.

Development cycle

Implementation BPMS involves an agile approach using multiple iterations. Each iteration is a mini project , and includes all necessary development cycle: planning, analysis, design, implement, testing and documentation. In parallel with these, additional activities such as documentation and mentoring will be taken place. This project is split into three iterations.

Each iteration delivers a working part of process that can be tested by the process team and can be presented to several workers from the department during a so-called playback sessions. Output of these sessions may be used in the following iterations.

In addition, each iteration should contain the necessary (integration) services in which the necessary business logics are delivered. This is done in accordance with the documented requirements so that it immediately can be tested by the process team and have the opportunity to give feedback. These tests will focus on testing small pieces of functionality that later will be tested as a coherent whole.

Intermediate test sessions of playbacks will also be organized for various

employees from the business. Small group(s) of end users will get the chance to get acquainted with the new system and provide feedback.

At the end of each iteration, evaluation will be made. Stakeholders will comment on the deliverables and documents will be presented during the iteration. The team will hold a meeting to assess the responses for the iteration. On this basis, improvement can then be made during the next iteration(s).

In the first iteration, the "Happy path" of the process will be built. It is generally the start of implementing a process. It is the process flow if everything works as expected. This path is normally the simplest path of a process. In the case of Customer Registration Process, the customer is known, the connection is created, there is no invalid consumption of water, etc. The process is executed without any expectations.

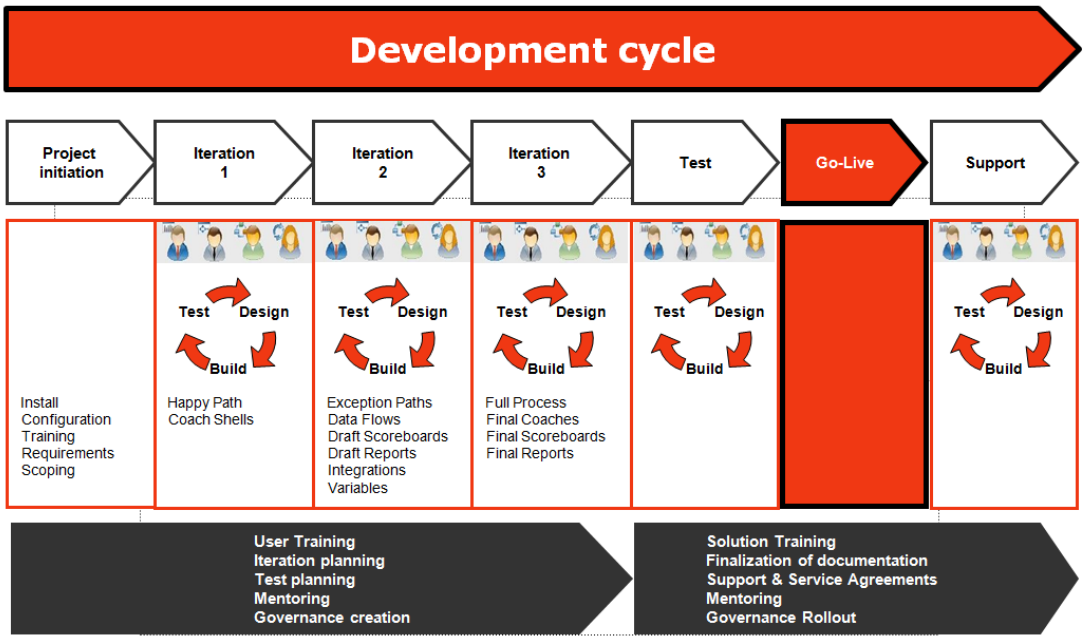

Figure 6: Development cycle

When designing a process, it is common to start with the happy path, and

gradually add the handling of more complex conditions or exceptions to it. Subsequent iteration could then capture the major exceptions, handle the integration with other systems. Figure 6 presents the development cycle of this project.

During the iteration 3, the exception paths build in iteration 2 will be "assembled" in to the iteration 1 which will make the process complete. Moreover, changes from previous iterations will be adjusted and optimizing request could also be fulfilled. When the implementation effort for this iteration is done, a true user acceptance test can begin. This eventually leads to the creation of a very detailed process from a "rough" process.

Testing

A principle of “test-first" will be used during the project. This means that the building activity happens in small steps and there are direct interactions between project team members so that each small step can be immediately tested and based on the feedback then can be adjusted (and then retested, etc.).

As ever a part of the process (e.g. a user interface, or an entire process step) is ready, it can be tested by process team members. Based on these tests, feedback is provided to developers who then - if necessary – make adjustments, it then be tested again. This is repeated as often as is necessary in order to achieve the desired result. In practice this means a close and direct cooperation between the developer and the business.

The purpose of testing is to verify if the application meets the predetermined requirements before the application goes into production.

The test phase is parallel to the development phase. Daily a part process or components are offered to testing. The completed process should be subjected to various tests. This requires involvement of various parties inside and outside the process team. It must also be stated who, when, and what test or if preparation is need for a test. This allows people to prepare themselves well and to bring the test environment in order.

For this project, a test flow is designed to ensure overall tests are accomplished properly.

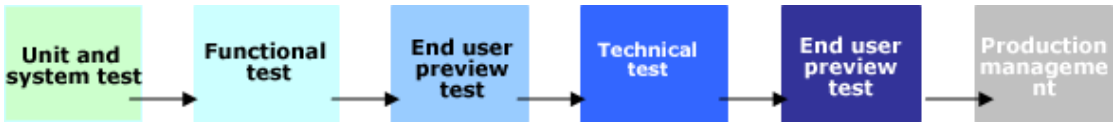

Figure 7: Test flow

Unit and system test are tests to ascertain whether the functionality of the code or a specific part of the code works as expected. They are performed by the developers themselves to test specific functionality they have build. It prevents some faults caused by careless coding of the developers.

Functional test are typically performed at the functional level by those who have designed the functional solution. It is determined whether the integrated components meet the functional requirements as defined. The system test plan contains process test scripts. These scripts describe the entire process and the possible exceptions and ensure that for every specific requirement as described is a relevant test scenarios to determine whether this requirement is completed. This ensures that all the system functionalities will be tested.

With end user preview test, intermediate test sessions of playbacks will be organized for various employees from the business. Small group(s) end users will get the chance to get acquainted with the new system and provide

feedback.

Technical tests including:

1. Performance test: a response and a stress test will be performed. A baseline is determined against which performance is measured and compared.
2. Regression test: Performed on the whole process to verify whether the already working functionalities are failed, if the environmental factors or input/requirement changed.
3. Integration tests are also performed by the process team and serve to determine whether the communication and interaction of the various development components or cooperation with other system work as designed. This usually happens gradually after each component part to verify the correct solution and to solve individual problems quickly if necessary.

If building is completed and the whole process is implemented, a User Acceptance Test can begin. This User Acceptance Test is done on the basis of test scripts. These scripts describe the entire process and the possible exceptions. The test scripts are compiled on the basis of the process requirements document. After all, the whole system should be tested.

Communication

Because of agile methodology emphasize direct communication, preferably personal contact rather than written documentation, the process teams and development team are housed in one location.

A daily Scrum meeting will be held among team members to analyze the status of the project. In this meeting the following key questions will be

asked and answered by all team members:

- What have you done since the last team meeting?
- What kinds of issues are faced?
- What do you plan to do by the next team meeting?

During this brief session, team members inform each other what they did the previous day, what they plan to do today, and what kinds of issues they are facing to if applicable.

Furthermore, daily feedback session takes place. A feedback session lasts half hour maximum, including feedback of results. During the feedback session, the solution of issues mentioned in the scrum meeting will be tested. During this session, the following agenda will be followed :

- Feedback from the results of the previous test;
- Testing of the newly build functionalities;
- Discuss the results and wishes;
- Capture the test results and feedback to the developer

Communication about the project will take place in two areas. In the first place, there is communication between the project team members. Secondly, it is important to regularly communicate the business about the changes that will take place.

Communication within the project team:

The members of the various project group(process team, business analysts, developers etc.) will work closely together throughout the project, so communication will frequently occur during the project. Nevertheless, it is important to organize a regular meeting where the progress and problems can be discussed. Hence it is necessary to have a weekly meeting.

Communication to the business:

During the project it is very important that communication to the business is carefully taken, in particular to manage expectations. By regular updating about the progress and explaining what has already been built and how the final solution will eventually work, the business will get used to the coming change and the acceptance of the new system will easier be realized.

An important form of communication is giving playbacks. During a playback, a (part of) process is presented to a group of stakeholders from the business. Since its initial playback generally is taking place quite soon after the start of the building, it is not intended to show a completely finished process but separate piece of functionalities. The final playback, however, can be organized to show the end-to-end process before User Acceptance Test starts. In this way, the participants of the playback will progressively get a better picture of what is built and get a possibility to give feedback.

Conclusions

Project outcomes

Reduced delivery schedules

Automation of process or redesign of process can lead to less time to complete a process which generates significant cost savings in terms of optimized resource utilization. By shorting cycle time, it also increases productivity, with the same time and the same resources, more instances can be completed with BPMS. The following table indicates the improvement BPMS has achieved for Customer Registration Process:

- Process before BPMS: 240 seconds
- Process with BPMS: 90 seconds
- Difference: 150 seconds (1 call)

It has resulted in a reduction of 52.000 calls between front office and back office which obviously increases the satisfaction of customers for faster handling.

Increased return on investment (ROI)

A well designed process increases straight-through processing rates, which results in significant reduction of manpower needed to complete the same amount of instances as before. For example, by automating an activity that requires 1 hour manual work of one worker, no human resource is needed any more to perform the activity. Thus, the process is completed in such way yields significant cost saving. The costs for the implementation BPMS for Customer Registration Process inclusive ICT environment is €1.2 million. With the aid of BPMS, 20 FTE's have been reduced. The cost of 1 FTE front office works is € 80,000 a year. Reducing 20 FTE will save €1.6 million. The

Return Of Investment is in this case 9 months, which is in accordance with a recent study from Gartner (Gartner inc. 2011).

A BPMS implementation is capable to provide tangible and intangible benefits. Some hard figures from the project have been stated in the previous sections, in the following, we are focusing on intangible benefits .

What's new?	After BPM(S)	Before BPM(S)
Customer focus	• Focus on results and creation of customer value • Focus on transparency and reduction of work transfers to achieve the end result • Optimal control to reach the results through processes	• Only focus on implementation of tasks within departments ('silo thinking') • Suboptimal control through departments
Process of the organisation	• Processes are standardized and will be carried out uniformly • Integral improvement cycle is furnished serving efficiency and consistent quality for customers	• Processes are insufficiently standardized and implemented differently by region • Improvement cycle is only furnished within departments which resulting insufficient focus on achieving end results
Clear roles and responsibilities	• Cooperation and the responsibility to reach the final result • Distinguish between management and implementation role for the purpose of transparent and optimal decision process • Implementation based on roles rather than functions for effective deployment of resources and competences	• Individual responsibility for each department • Management and implementation role insufficiently furnished which lacks transparency and suboptimal decisions are made • Implementation based on functions and task-oriented which allowing overlap of work
Focus on core processes	• Focus on primary processes • Generic and future-proof processes model • Bottom-up enhancements are centrally integrated	• Insufficient distinction between primary, supporting and controlling processes • Improvement Initiatives mostly invested locally (no centrally)

Figure 8: Comparison between before BPM(S) and after BPM(S)

Embracing Agile methodology, BPMS has leveraged a great value to the business processes and helped Vitens to achieve dramatic business result. Figure 8 provides a comparison of several aspects within the business organization clarifying the improvement BPMS has offered.

The desired results are impressive which is in accordance with the stated objective of the project, therefore it *increased the ability to meet with the*

current customer requirements. The processes are very efficiently organized. There are clear visible improvements in the process directly after go-live. We experienced a 63 percent decrease for the average time in process handling. Evidently, Agile has *improved business processes*. Meanwhile, issue management is well regulated by the predetermined structure and necessary feedback are given very quickly in virtue of fast communication. Furthermore, there is a high involvement of the development team and the process team; all members in the project feel very responsible. In sum, as has been evidenced from above analysis, Agile methodology has helped Vitens to *increase flexibility to meet with the changing customer requirements.*

At this point, this paper has introduced BPM(S) and the benefits of it, also the Agile methodology and his characteristics are described. Furthermore, a detailed, phased approach analysis of implementing the BPMS project is provided. Through analyzing the outcomes of the project, it is obviously that the project has successfully achieved the desired goals by applying the Agile development methodology. Finally, the answer to the research question: the Agile development methodology does suit the business and IT needs of the Business Process Management System implementation project for Vitens' core process Customer Registration.

Suitability

Now that we have concluded that Agile methodology is successfully applied in the project, and Vitens has gained a lot of benefits, we may proceed to searching the suitability of Agile methodology to other projects or other organizations based on this case study by applying theoretical framework.

Vinekar (2006) develops a framework (figure 9) that identifies the best strategy of information system development by assessing the contingent effects of project uncertainty and organizational culture.

Project uncertainty		Individualistic	Collectivistic
	High	Responsive Process	Agile
	Low	Traditional	Creative Optimization

organizational culture

Figure 9: The relationship between project uncertainty and organizational culture

Uncertainty attributes and their scores*

Attribute	Uncertainty score 1	3	5	7	10
Market uncertainty	Known deliverable, possibly defined contractual obligation	Minor changes in market target expected	Initial guess of market target likely to require steering	Significant market uncertainty	New, unknown, and untested market
Technical uncertainty	Enhancements to existing architecture	We think we know how to build it	We're not quite sure if we know how to build it	Some incremental research involved	New technology, new architecture; might be some exploratory research
Project duration	1–4 weeks	6 months	12 months	18 months	24 months
Dependencies, scope flexibility	Well-defined contractual obligations or infrastructure with published interfaces	Several interfaces Scope isn't very flexible	Scope has some flexibility	Some published interfaces Scope is highly flexible	No published interfaces

* *Minimally complex = 1, highly complex = 10.*

Figure 10: Uncertainty attributes and their scores

In order to determine the uncertainty of this project, we used the uncertainty attributes and score (figure 10) of Little (2005) to indicate the uncertainty.

- *Market uncertainty*: Little (2005) provided one amplifier that can be used to indicate market uncertainty by relating the uncertainty to the number of customers. The more customers, the more uncertainty.
- *Technical uncertainty*: because of BPMS is a new technology for Vitens, the architecture is built from ground up, the technical uncertainty is highest.
- *Project duration*: The whole BPMS implementation project including process Customer Registration takes more than 24 months. The longer the project takes, the more uncertainty the project has.
- *Dependencies and scope flexibility*: there are other projects depending on this project, which use the interfaces of BPMS. In addition, the scope of the project is highly flexible, only high level processes are analyzed for the scoping of the project.

According to O'Reilly et al (1991), "a 'collectivist' culture typically involves a decentralized structure and a flexible environment to support adaptive teamwork." In the case of Vitens, process team members are composed of workers from different departments who describe and adjust the process. Many decisions of the process are made decentralized. Hence there is a collectivistic organizational culture.

To recap, the uncertainty of this project is very high while the organizational culture is collectivistic. Based on the table of Vinekar (2006), it is suggested that the Agile methodology is best suitable for this project.

By applying this theoretical framework, this paper has provided an empirical confirmation towards this framework of identifying strategies of IS development, which implies that the Agile methodology is suitable in a project where the uncertainty is high and the organizational culture is collectivistic.

Drawbacks of Agile methodology

Despite all those positive experience, the project infers some drawbacks of Agile methodology summarized as below:

Planning

Since Agile methodology promotes adaptive planning and the true nature of short iterations, time and resources can be hard to estimate. Without a detailed estimate, a fairly accurate planning is virtually impossible. It has resulted that not all components are completed before the deadline. The planning was not feasible which has caused a heavy workload and brought a bad atmosphere to the project team at the end of the project.

Documentation

Because that agile methodology advocates face-to-face communication and less written documentation, it has resulted in scant documentation, which cannot be neglected. It has been notified by project members that assurance of documentation and dissemination of knowledge is imperfect, it is often not clear which documents are in circulation, where document can be found. Likewise, many decisions have been made in the project, but often it is hard to find out which document those decisions are based on and why they were taken.

Requirements

There is a long time needed to capture the requirements. Besides, some important features might be forgotten or misunderstood, as a result of that development begins before the requirements are fully defined. It means that additional work later in the project is required, there's a strong indication that this has delayed the planning.

Scrum meeting

Implementing BPMS with an agile method is new at Vitens, the awareness of method by employees is absent. More attention should be given regarding the method, for example, by organizing a workshop.

Organizations

In the project, it is observed that there is little structure in the organization, and there is no real clear concrete division of labor. This is experienced as chaotic and confusing. There shall be clear working arrangements. A description is needed for each person about his/her responsibility. Moreover, the analysis phase should be completed before any building activities are started, so that there is more clearness about the separation of the work and more structure can be brought into the organization

Cooperation and Communication

Due to the expansion of the numbers of project members, at the end of the project, developers and process team are not anymore located in the same room which causes an ineffective communication.

There is too little communication to other departments and employees inside Vitens. Communication with other departments for which input is needed are experienced as painful. The feedback is slow and laborious.

It is also indicated that the communication in the beginning of the project went well. At the end of the project, cooperation has decreased due to high pressure to reach the deadline as a result of tight planning. A more realistic planning is needed to draw more time and space for a proper collaboration and communication.

Testing

It is suggested that developers and testers should sit side by side; If they are working in pairs, the number of issues would go down and issues found can immediately be resolved and tested which reduces the turnaround time of the issue.

Conclusion

The ultimate purpose of BPMS is to help a business organization to improve and optimize the process in cost, time, and quality. Furthermore, with BPMS, Vitens is no longer running behind the facts. BPMS provides a real-time and historical insight to all processes within Vitens. How the departments and processes are actually functioning can easily be monitored by BPMS.

Agile software development provides a structured approach to implement a BPMS including identify, document, analyze, measure and improve the business processes, characterized by principles of iterative and incremental development, continuous testing, and frequent re-planning based on current reality. It serves as a proper methodology in a BPMS implementation project where the need for flexibility and adaptability of the organization is ingratiated, and where benefits such as cost savings and greater customer satisfaction are achieved. The Agile methodology is therefore considered to be successful suiting the business and IT needs of Business Process Management System implementation project for Vitens' core process Customer Registration.

Nevertheless, the project demonstrates some weaknesses of Agile methodology in a BPMS implementation project. One vital weakness indicates that an accurate planning is hard to achieve due to a true nature of short iterations and the adaptive planning characteristic of the methodology. Recommendation towards this issue might be a precise and careful analysis prior to iterations in the project initiation phase.

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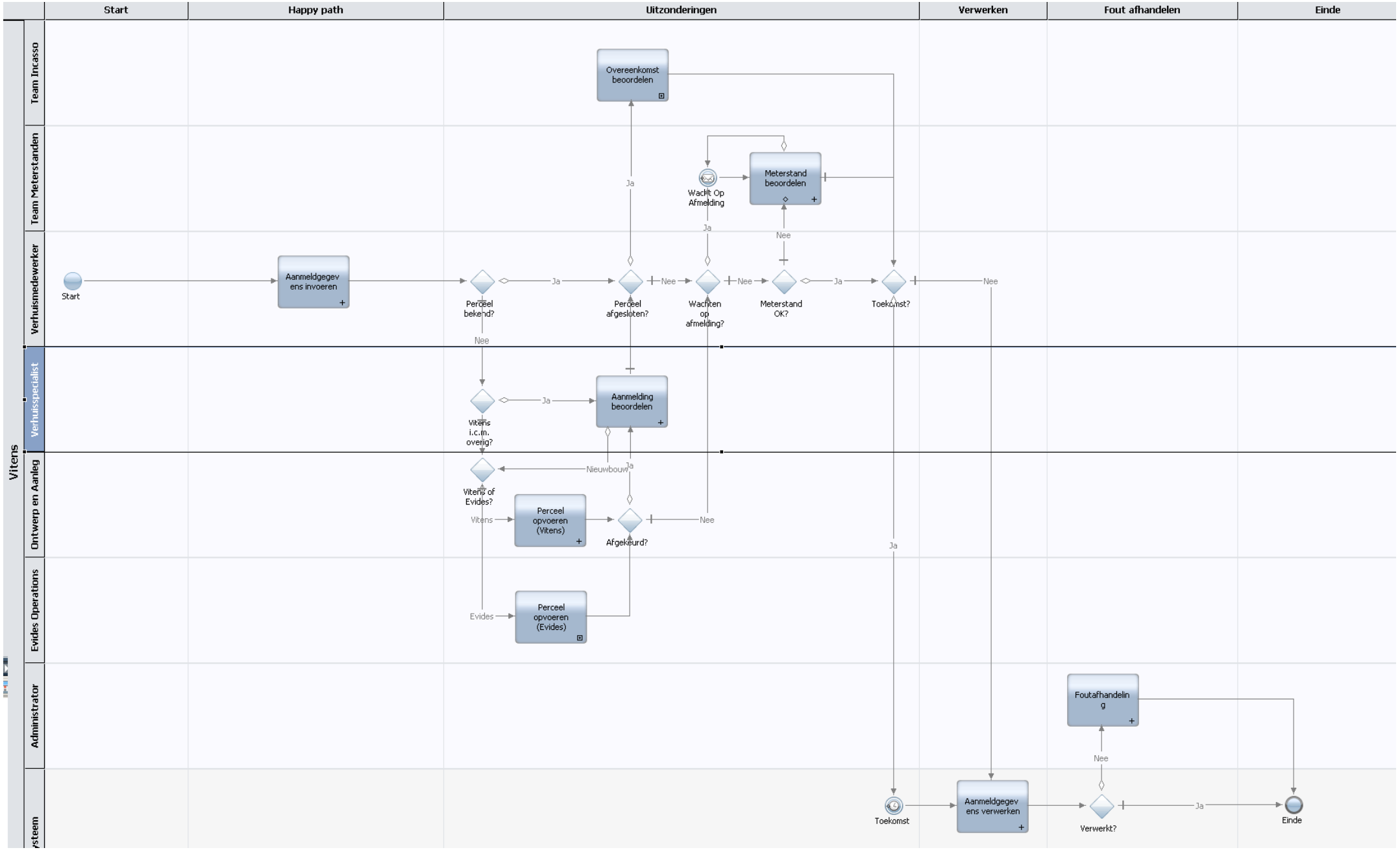
Appendix

No.	Name	Scientific	Professional	Characteristics	Source
1	Pronto		X	DEMO, speech-acts	www.sogeti.com
2	Cordys@Work		X	Agile software development method	www.c http://www.sogeti.com
3	ARIS House of Business Engineering (HOBE)	X	X	Based on ARIS architecture	Scheer and Nüttgens (2000)
4	ADEPT (An Agent-Based Approach to BPM)	X		Agent based approach	Jennings et al. (2000), Rinderle, Kreher and Dadam (2005)
5	Interactive, process-oriented system development (IPSD)	X		BPR	Van Der Aalst and Van Hee (2002)
6	Process Innovation Method	X	X	BPR and process improvement	Malone, Crowston and Herman (2003)
7	Six Sigma	X	X	Six Sigma, lean manufacturing	De Feo and Barnard (2005)
8	Goal-Oriented Organization Design (GOOD)	X	X	Human interaction management	Harrison-Broninski (2005)
9	Rajagopal ERP implementation	X		BPM	Rajagopal (2002)
10	Strategy Driven Approach	X	X	CMMI	Jeston and Nelis (2006)
11	Smart BPM		X	BPMS	www.pegasystems.com
12	Pattern based approach	X		BPR	Brahe and Bordbar (2007)
13	Business Process Maturity Model (BPMM)	X	X	CMMI, BPR and TQM	Curtis and Aalden (2006)
14	RACI method		X	Project management	http://www.gordiantransformationpartners.com
15	A Systems Approach to BPM		X	BPR and enterprise architecture	Ramesh.(2005)
16	Bizzdesign's BPM approach		X	Process modeling and BPR	www.bizzdesign.com
17	Nine-step approach (Capgemini)		X	Process maturity based	www.capgemini.com
18	Goal driven BPM		X	BPM	www.tibco.com
19	Fitzgerald and Murphy's implementation	X		BPR	Stoica, Chawat and Shin (2004) Fitzgerald and Murphy (1996)
20	BPM Implementation method		X	Workflow management and BPR	Burlton (2001)
21	BPR method		X	BPR	Hammer and Champy (2001)

Appendix 1: BPM (-related) implementation methods



1 Appendix 2: desired process model