# Effectual principles in business process redesign
## a methodology and supporting software

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*Award date:*
2012

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# Effectual Principles in Business Process Redesign: a Methodology and Supporting Software

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In partial fulfillment of the requirements for
the degree of Master of Science in
Business Information Systems

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Eindhoven, August 2012

# Abstract

Presently, organizations are facing an increasingly uncertain environment in which business process requirements can change abruptly. This poses high risk for long-term costly business process redesign projects. In this thesis we will present a business process redesign methodology which uses principles of effectuation. Effectuation, a theory of entrepreneurial behavior, focusses on available means, affordable loss, strategic partnerships and the leveraging of contingencies.

# Acknowledgements

This thesis is the end result of the Master program Business Information Systems at Eindhoven University of Technology (TU/e). The research was carried out in the Information Systems group within the department of Industrial Engineering in collaboration with Perceptive Software Apeldoorn. Throughout this project I have received help from several people.

I would like to thank Hajo Reijers, who insisted from the start to make this my project. You gave me the freedom to go my own way which was difficult in the beginning and gave direction when needed. Also, I would like to thank Maria Zimakova, who always had time to discuss ideas and problems, and made Apeldoorn a great working environment. I would like to thank Isabelle Reymen, who I used as a sounding board for her knowledge on effectuation. And finally, I would like to thank Boudewijn van Dongen, who agreed to be on the assessment committee. Thank you all for your time and dedication.

Furthermore, I would like to thank everyone who invested time in giving feedback, whether this was on the thesis itself or during the evaluation of methodology and technology. I salute all foosball players in Apeldoorn, who provided me the necessary distraction from this project during the lunch breaks.

Finally, I would like to thank my parents and Sandra, the most important people in my life. They encouraged me to keep going, where others suggested I should give up. Their support got me where I am now.

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# Executive summary


## *Motivation*

Business process redesign projects are complex to begin with. Traditionally, possible benefits of BPR projects are carefully calculated and evaluated on beforehand, before the project itself is planned out. The execution of these projects usually follows a linear approach over a long period of time. In times of economic uncertainty and rapidly changing environments, organizations cannot afford to invest considerably in such inflexible long-term projects.

## *Objective and procedure*

Effectuation is a theory of entrepreneurial behavior, which describes how expert entrepreneurs behave in uncertain environments. The theory describes several principles that help entrepreneurs pursue opportunities with limited means and low risk. Furthermore, the use of partnerships and leveraging of contingencies by staying flexible are important aspects of effectuation.

In this thesis, we will discuss literature on business process paradigms, effectuation and organization culture. The goal is to develop a business process redesign methodology using effectual principles. It is assumed that organizational culture plays an important role in for this methodology to be accepted by organizations and its employees. Therefore, organizational culture will also be covered in this thesis. We will also present a web-based collaboration platform which should guide organizations in applying this methodology.

Both methodology and technology will be used to support the initial steps of redesigning two business processes to evaluate the acceptance among prospected users. This evaluation will measure the perceived usefulness, perceived ease of use and intention to use of methodology and technology using the Method Evaluation Model (MEM) and Technology Acceptance Model (TAM).

## *Results*

The result of this thesis is a participative business process redesign approach, which encourages employees to be part of improving their own business processes. The methodology focusses on the creation of partnerships amongst employees and experiments with selected process improvements. These experiments are small, cost little initial investment and thus pose low risk for existing operations of an organization. Only after improvements have proven themselves during these small experiments, the time-consuming and costly activities of detailed design and implementation are performed.

The results from the evaluation indicated that actively participating in applying this business process redesign approach has beneficial effects on the acceptance of the methodology. The first attempt to implement a web-based collaboration tool was acceptable, but further improvements are necessary to improve the ease of use. Not applying the methodology in full is assumed to have detrimental effect on the perceived usefulness of the technology.

Results on passive participants of the evaluation, who only observed others at work, showed a decrease in acceptance overall, for both methodology as technology. Future research should point out what contributed to this decrease and how difficult it would be to motivate these participants to eventually actively participate.

# 1 Introduction

In this section a short introduction for this thesis is given. In section 1.1 we start by describing the motivation for the research documented in this thesis. Section 1.2 describes the research questions. Next, section 1.3 defines the scope of the thesis. Finally, section 1.4 will describe the structure of the rest of this thesis.

## *1.1 Motivation*

Business processes are chains of activities using organization's resources and are executed in a specific order, to produce a product or provide a certain service to an internal or external customer. Most business processes do not last forever and need to be changed along the way. Business process redesign is an approach to change the business process to meet the changed requirements.

Although business process redesign (BPR) has been around for more than two decades, still a majority of BPR projects are not successful [***1***], i.e. the end-results of the projects do not meet the expectations.

Due to the uncertain financial climate and increasing globalization, the environment in which organizations operate is highly uncertain. Historically, BPR projects are executed in an inflexible manner which requires commitment and investments early in the redesign initiative. On top of that, the results of large BPR projects sometimes do not even meet the requirements of the organization or its employees at the time of delivery [***2***]. There seems to be a need for a BPR approach which emphasizes flexibility and low initial investments, keeping a close eye on the changing requirements of an organization.

## *1.2 Research objectives*

In the field of entrepreneurship a shift is going on from the belief that a static approach based on prediction is the answer for successful entrepreneurial endeavors, to the belief that in the uncertain and unpredictable environments a flexible approach is more appropriate [***3***]. Effectuation is the theory that advocates flexibility and eschews planning and predictions on a future that cannot be predicted.

The uncertain environment in which organizations conduct BPR projects nowadays calls for a flexible approach. This approach should limit risk taken by organizations and should remain flexible to changing requirements. This brings us to the first two research questions:

[RQ1] How do we develop a flexible BPR methodology which is based on effectual principles?

[RQ2] Will an effectual BPR methodology be accepted by prospective users?

The use of IT has only increased over the years to redesign or manage business process. Therefore, we will also investigate how supporting software should look like, which brings us to two additional questions:

[RQ3] How do we develop a platform which supports an organization in applying an effectual BPR methodology?

[RQ4] Will a supporting platform be accepted as a valuable addition by prospective users when applying an effectual BPR methodology?

Answering these questions will be the goal of this thesis. In the next section, we further define the scope.

## *1.3 Scope*

In this thesis we will develop an effectual BPR methodology, and a collaboration platform supporting this methodology. We will measure user acceptance of both, using two proven models that measure the intention to use. This thesis will also cover the subject of organizational cultures. We will deduce a culture in which an entrepreneurial methodology would fit well. However, to what degree the organizational culture influences user acceptance will not be part of the research.

## *1.4 Structure*

In section 2, we will introduce several concepts which will be used throughout this thesis. Section 3 will be used to analyze problems with current BPR methodologies and how effectual principles provide a different approach to BPR. In section 4, the design of the effectual BPR methodology will be explained and the methodology will be described in detail. Also, the supporting software will be presented in this section. The evaluation will be discussed in section 5, where also the results will be presented and interpreted. Finally, section 6 contains conclusions, limitations of this thesis and directions for future research.

# 2 Literature review

In this section we will introduce and discuss several topics which are eventually used within this thesis to design an effectual BPR methodology. First, in section 2.1, we will discuss business process redesign. In section 2.2 we will discuss a specific human-centric BPR approach called participative BPR. Then we will discuss current business process trends in industry, namely business process management and social business process management, in section 2.3 and section 2.4 respectively.

In section 2.5, we continue discussing a social concept in which complex problems can be discussed in a structured way, called large-scale argumentation.

In section 2.6, effectuation will be elaborated and current research will be discussed. Second to last we will discuss existing organization culture types according to Cameron and Freeman [***4***] in section 2.7. Finally, we will introduce in section 2.8 two proven models which will be used to actually measure user acceptance.

## *2.1 Business process redesign*

In the early nineties the concepts business process redesign and business process reengineering were introduced [***5***] [***6***] (from now on we will use the term *business process redesign* to refer to either, and abbreviate it to BPR).

Information technology (IT) was seen as the main enabler for radical improvements within organizations. Before the introduction of BPR, IT was used to improve separate components within one business process. Different departments within the organization had used IT to improve functions within their own department, without thinking about what this would mean for the rest of the business process. This has led to the use of different databases and systems within the same process. Logically, this has detrimental effects on the maintainability and understandability of the business process.

BPR advocates a process-wide view and the use of IT when improving a business process. In order to guide organizations in doing this, Davenport & Short [***5***] identified five steps to take when redesigning a process:

1) Develop business vision and process objectives
2) Identify the process to be redesigned
3) Understand and measure existing processes
4) Identify IT levers
5) Design and prototype process

From these steps can be deduced that BPR projects have a much broader scope than just business functions. BPR takes the vision of the organization and a critical business process. With the vision in mind, it should be determined what parts of the selected business process requires attention. From this point, problems in the process should be addressed with in the back of the mind the capabilities that IT has to offer. After, the best of the generated alternatives will be designed, prototyped and implemented.

Changes are not always required because of problems within the existing process. Opportunities offered by the environment often also require the organization, and thus its processes, to adapt. New technology often offers opportunities to further improve business processes.

The term BPR has been used by many organizations to automate certain parts of their business and, in turn, lay off employees that were responsible for manually handling that part of the organization. As a consequence of this misuse, the term BPR has obtained a negative reputation as being the cause of people losing their job.

With the emerging of BPR several approaches, methodologies, techniques and tools have been developed to support BPR projects. The developed approaches and methodologies differ from each other in their emphasis. For example, the focus of one approach can be on using IT, while another focusses on human resources [***7***]. Kettinger et al. conducted a study into 25 different BPR methodologies and they derived six stages that should be completed within a BPR project. They developed the so-called Stage-Activity (S-A) Framework (Figure 1) which describes these six stages [***8***]:

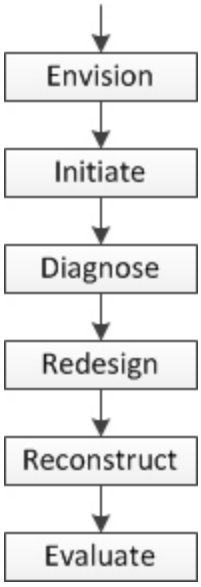



**Figure 1 – The S-A framework by [*8*].**

- In the *envision* stage the impetus is given to start a BPR project. A business process is targeted for improvement based on organization's vision and IT opportunities.
- The *initiate stage* encompasses the project planning, setting of goals and composition of the project team.
- In the *diagnose* stage the as-is situation of the business process is documented and often modeled. Process requirements and customer value attributes help determine problems within the existing process.
- In the *redesign* stage the new business process is developed. The new process design is chosen from alternatives created through creative sessions. Within this stage also the analysis, documentation and prototyping is conducted.
- In the re*construct* stage the new process is implemented, which means migration of systems, responsibilities and human resources.
- In the *evaluation* stage the new process is monitored and connected to an organization's total quality program.

Furthermore, Kettinger et al. identified 21 main activities, each executed in a particular stage. In their research was stated that 19 out of 25 methodologies investigated were consistent with the sequencing of stages as in the S-A Framework. This indicates that a majority of the observed methodologies follow a linear model.

The focus on IT-enabled BPR made sense, since it was suggested that most business processes were developed before modern computers and communication technology [***5***]. Nowadays, it is hard to imagine an organization not employing IT to manage processes and even organization-wide operations. This means that in the present redesigning business process requires a somewhat different approach instead of radical IT-enabled BPR.

A more human-centric BPR approach is called *participative BPR*. This approach will be discussed next.

## 2.2 Participative business process redesign

Participative business process redesign relies on process performers to help redesigning their own processes. By letting process performers be responsible for the improvements, the organizational resistance will decrease because process performers will not perceive a BPR project as treat to their jobs. Additionally, individuals will feel a sense of ownership when they are involved in projects which improve the business processes they operate in [***9***].

Also, the high costs associated with hiring external consultants can be avoided [***9***]. The hiring of external consultants can be beneficial in the sense that they would have a neutral and critical view on the existing business process. A drawback of using external parties to improve an organization is that proposed solutions might not fit with the then-current organization culture. As it is difficult enough to determine what will, or might not work. Because suggestions based on a gut feeling are a shot in the dark, the risk exists that proposed changes are not accepted.

The involvement of process performers in the redesign process already brings valuable information on how certain proposed changes are perceived. However, it should be kept in mind that individuals working within a business process are no business process professionals or modelers.

**Participatory Approach to Workflow Design (PAWS)**

In the search for existing literature on the subject of participative BPR we came across PAWS [***9***]: a participatory approach to BPR. In the paper, a method was described that consisted out of six consecutive stages shown in Figure 2. In this method a consultant has the responsibility to support the act of improvement of the process performers. First employees are trained to use this method, after which they need to create a process model depicting the current process. During the elicitation phase and using the process model, existing problems are identified. In the next phase, solutions to the existing problems are generated. The different alternatives are evaluated by management using simulations and possibly by an external party. Eventually, one process model is selected to be implemented. In PAWS it is assumed that a process model will be translated to workflow model which can serve as input for a workflow management system (WfMS). A WfMS is a system that defines, creates and manages the execution of workflows within an organization [***10***].

The system that eventually is developed should also be maintained. Maintenance is considered to be a 'mini reengineering cycle', because actions have to be taken similar to actions performed in previous phases.

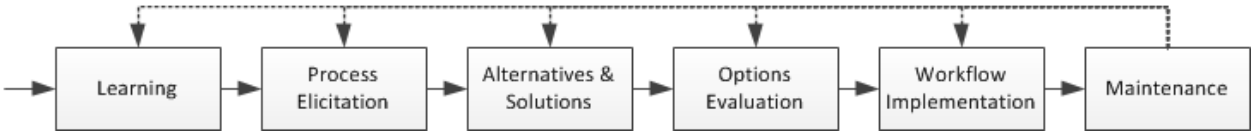



**Figure 2 – The PAWS approach [*9*] with six consecutive phases; the dotted line indicates paths taken during the maintenance phase. The maintenance phase can be considered as a 'mini reengineering cycle'.**

Over the years new concepts have been introduced that build upon BPR, examples are business process improvement (BPI) and business process management (BPM).

BPI, as should BPR, offers organizations a systematic approach to improve the quality of the execution and the output of their business processes. Where BPR is seen as a radical approach starting from a clean slate, BPI is seen as an incremental approach using existing processes to build on. In both BPR and BPI, rethinking the way how currently business processes are executed is the central issue. BPI can be considered a less drastic approach compared to BPR, while still redesigning fundamental parts of a process. By proposing less drastic changes to employees, acceptance of these changes might be more

likely. One might think that the shift from radical IT-centric BPR to the more careful incremental BPI is because the human side of a business process seems to be more important that initially thought [***11***].

Advancements made in IT and continuous focus on business processes caused a new paradigm to arise: business process management.

## *2.3 Business process management*

Business process management (BPM) encompasses continuous monitoring of the execution of operational business processes and improvement thereof based on the reported metrics. Monitoring is used to keep business processes aligned with the organization's strategy and goals. Also, BPM is used to diagnose temporary or fundamental problems in the process, so that an organization applying BPM can take the appropriate action to solve these problems [***10***].

BPM and business process management systems (BPMS) are now sold by several big vendors as a way to map and define organization's processes. The market for these BPMS was in 2005 estimated to be worth between 1.5 and 2 billion Dollars [***12***]. These systems support the execution and monitoring of business processes. Based on observations processes can be adjusted continuously to optimize the execution of the process.

BPM can be seen as an umbrella under which BPI and BPR approaches can be applied. BPM is a continuous process and is customer-centric. In BPM, redesigning and improving the process means creating additional value for the customer. For example, by shortening the processing time of an order, adding more control or increasing the quality of the deliverable end-product. Again, new technologies or demands from the environment can also cause the need to change a process.

Figure 3 shows the BPM life cycle as introduced by [***13***]. It consists of five stages which are visited in a certain order. The *design phase* entails the creation of a new process model, based on input from the diagnosis phase. So with the process model of the as-is situation in one hand, and reported issues from the previous phase in the other, alternatives for the current situation are thought of. A process model in this case, consists of a process structure, resource structure, allocation logic and description of the interfaces.

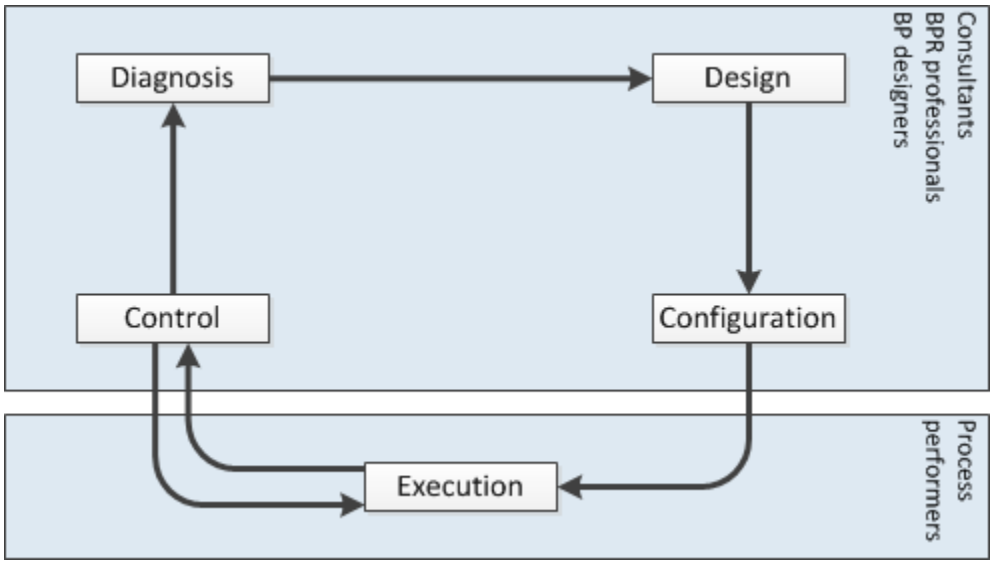



**Figure 3 – The BPM lifecycle as introduced by [*13*]. We have added the roles which are responsible for a particular part of the process.**

The *configuration phase* follows from the design phase. In this phase the actual implementation of the newly proposed process takes place. In the paper [***13***] it is assumed that a process model serves as input for a workflow management system (WfMS). BPM is sometimes used to refer to the automation by WfMS and ERP systems, but these systems are only a small part of the systems available for use and do not grasp the whole BPM concept [***14***]. In reality, a process can also be supported by several different standalone systems across different departments. When everything is in place, the process can be executed by process performers in the *execution phase*. Data will be gathered during the execution of the process in the *control phase*.

In the control phase case-based data and global performance data of the process is gathered [***13***]. Temporary problems which are found are coupled back to the execution phase. For example, a sudden unforeseen rush on loan applications can cause the process to be clogged up. For a certain amount of time extra resources are needed to process these applications, but no redesign of the process is needed.

During the control phase persisting problems and bottlenecks serve as input for the *diagnose phase*. In the diagnose phase information collected in the control phase is used to discover opportunities for improvement of the process.

Finally, we will discuss a new trend in the field of BPM: social BPM. The rise of social networking websites, for example Facebook, Twitter and Wikipedia, gave researchers a way to overcome weak social networks between employees working within the same process. Social BPM is supposed to be an answer to the rapidly globalizing and changing environment in which organizations reside nowadays.

## *2.4 Social business process management*

The environment is getting more and more dynamic and a way to catch rapid changing requirements is *social BPM* (introducing a new abbreviation: SBPM).

SBPM is currently widely discussed: a debate is going on what it exactly is and for who it is [***15***]. SBPM can be used in two different ways [***16***]:

- SBPM offers a collaboration platform for business process developers, analysts and other professionals managing an organization's business processes.
- SBPM offers a collaboration platform for users of BPM systems.

In the first case, SBPM is used as a name for a collaborative process development environment, a specialized type of application development [***17***] . Clay Richardson (IBM) defines SBPM as *"Processes developed and improved through the use of social technologies and techniques"*. In this sense SBPM provides, in addition to what BPM provides, collaborative modeling and business process wikis, for example.

In the latter case, SBPM applies to the actual executers of the processes. Here, again, there are actually two different areas in which the 'social' part occurs. One area specifies SBPM as offering support to users during runtime. This support from a system to a user can, for example, be in the form a recommendation on what to do next. In the other area SBPM is seen as creating an environment in which business process executers are able to give feedback on process enhancements and improvement during runtime.

Business process redesign can be a very complex activity [***18***]. Several solutions exist to discuss topics within a community, for example e-mail, blogs and web forums. A new approach uses large-scale argumentation, which provides a schematic structure that reduces redundancy and increases clarity of discussions [***19***].

## 2.5 Working on complex problems collaboratively

Large-scale argumentation uses deliberation mapping to structure an ongoing discussion. A deliberation map is a tree-structured network of posts contributed by participants of a discussion. Within the deliberation map the ideas and problems on a certain topic are documented and discussed among participants. Social technology creates great potential since it enables building upon ideas of others, allows for great diversity and enables wisdom of the crowd [***19***]. At MIT, they have implemented a system that uses these underlying concepts to evaluate experiences in a range of contexts, called the Deliberatorium [***20***].

The Deliberatorium was developed by the MIT Center for Collective Intelligence with as goal to harvest collective intelligence on complex problems. Solving complex problems using asynchronous communication requires a different approach than offered by traditional social technology, e.g. a bulletin board [***19***]. Traditional social technology is susceptible to disorganized content, low signal-to-noise ratio, quantity rather than depth, polarization and dysfunctional argumentation [***19***]. The Deliberatorium was developed in an attempt to structure ongoing discussions in a deliberation map.

A deliberation map follows a certain structure, as shown in Figure 4. Issues are followed by ideas or sub-issues, ideas are followed by issues or arguments. This makes asynchronous communication happen in a structured way. Furthermore, each post represents a single statement; responses to this statement will be linked to the respective post. This allows for a clear overview of what has been said and what statements are related to each other.

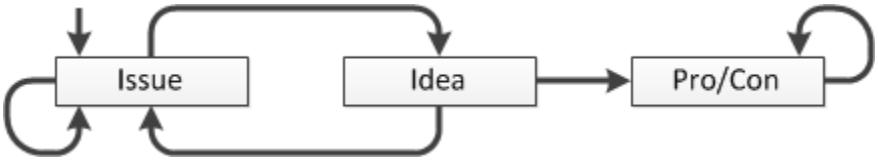



**Figure 4 – The template used for documenting discussions on complex topics. Issues can be followed by subissues or ideas; ideas can be followed by new issues or arguments in favor or against [*19*].**

Figure 5 shows a screenshot of the Deliberatorium. When a node in the tree is selected, a post will appear in a separate frame on the screen. A post contains a main statement which is shown in the deliberation map itself. A description further explaining the statement resides in the post. Comments can be added discussing the content of the post. Comments should be used to suggest how to improve the post. Actual discussions on the contribution itself belong in the deliberation map. Another important aspect is that peers are allowed to vote on how beneficial the contribution is to the overall discussion.

The Deliberatorium is at the moment of writing still under development. An example of change in the current version of the Deliberatorium is that it since recently allows ideas to be directly connected to parent ideas. We theorized that the reason for this adaptation is that this lowers the threshold to further refine an existing idea. Originally, a new issue had to be created to ideas, so that sub-ideas could be added again. Mark Klein, creator of the Deliberatorium, confirmed that this was the reason for the change. He acknowledged that the research behind the Deliberatorium is still trying to find a balance between formal rigor and usability [***21***]. We do, however, think that understanding what the relation is between ideas and immediate sub-ideas will become more difficult.

We have discussed business process and several paradigms related to business processes. We have discussed deliberation mapping as a way to solve complex problems collaboratively. A goal of this thesis is to develop a BPR methodology which uses principles of effectuation. What effectuation is and what the status is of current research will be discussed in the next section.

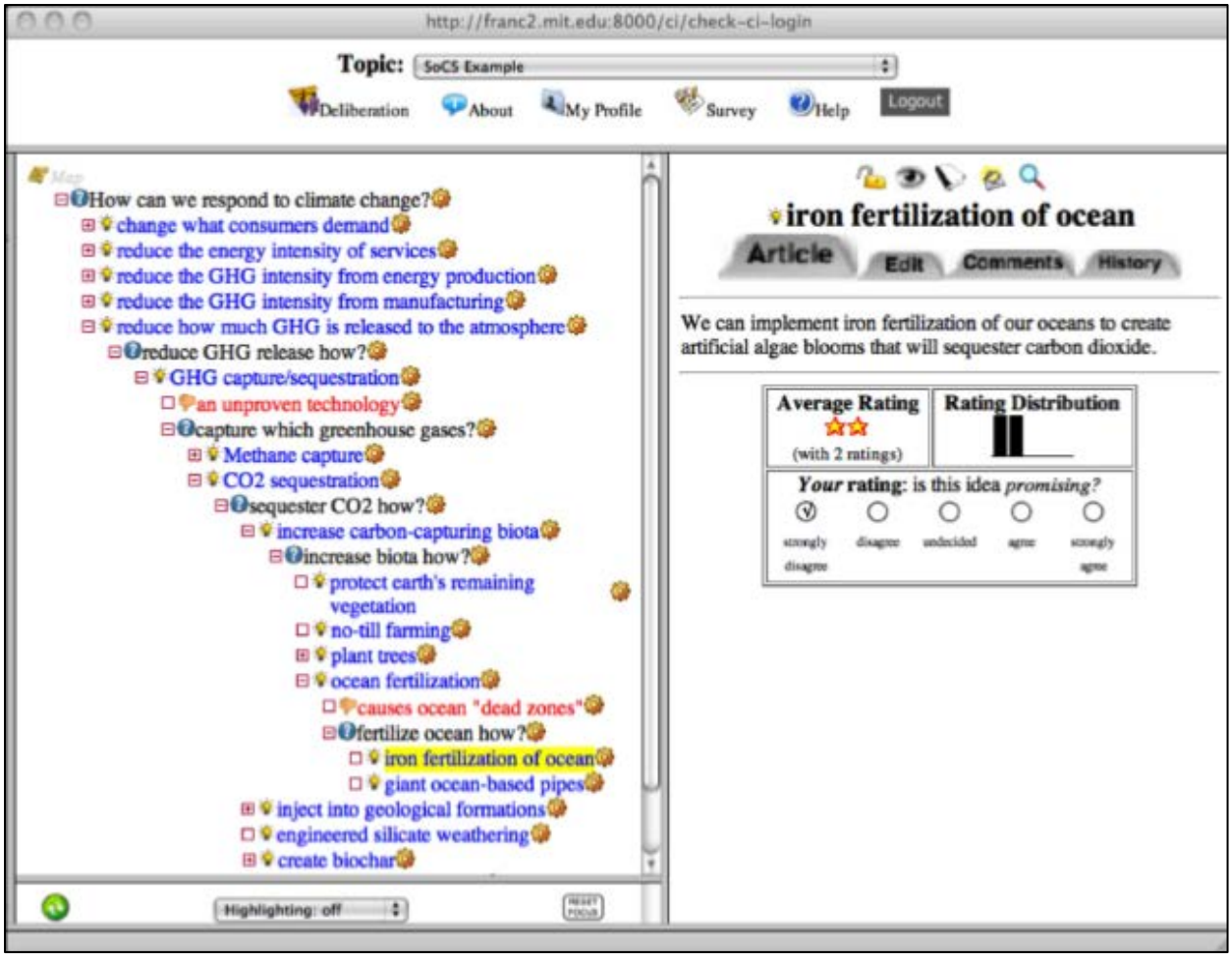



**Figure 5 – A screenshot from the Deliberatorium [*19*] with on the left a deliberation map, and on the right the selected post.**

## *2.6 Effectuation*

An important concept used in this thesis is *effectuation*, a relatively new theory within the field of entrepreneurship. Studies have shown that expert entrepreneurs approach problems in a different way than novices, viz. in an effectual way [***3***]. Effectuation is the opposite of causation, which is another well-accepted approach known within the field of entrepreneurship.

**Effectuation versus causation**

Expert entrepreneurs using an effectual approach are means-oriented. These experts will focus on the means at hand and determine, based on those means, what solution directions they can investigate. Causal entrepreneurs, entrepreneurs applying *causation*, are goal-oriented and use those goals to determine what means they need to attain those goals.

From the three effectual principles, the first is *affordable loss*. Affordable loss states that an entrepreneur needs to determine on beforehand what he is willing to lose in the worst-case scenario pursuing an opportunity [***22***]. Within causation it is more important to determine on beforehand what the expected result is of a certain opportunity.

The second principle of effectuation is *leveraging contingencies*, which states that unforeseen events in an uncertain environment should be embraced by an entrepreneur. These unforeseen events should

then be used to his advantage. It is therefore important to stay flexible during the initial phases of starting-up a firm or developing a product. An effectual entrepreneur advocates non-predictive control: *to the extent we control the future; we do not need to predict it.* Causation, in contrast, focuses on prediction and pre-existing knowledge; *to the extent we can predict the future; we can control it* [***23***]. An entrepreneur, using a causal approach, values information gathered from predictive and statistical tools, while an entrepreneur using effectuation will hardly consider it when making decisions [***24***].

The last effectual principle is *strategic partnership*. This principle states that an entrepreneur should focus on partnership. Partnerships can be valuable for chasing an opportunity since it provides extra means for example. In a causal approach, however, the focus is on competitive analysis where is analyzed what the competition has to offer and how they perform.

**Effectual framework**

The effectual process is visualized in Figure 6. Using these effectual principles an entrepreneur starts the effectual process assessing his means answering three basic questions: Who am I – considering personal traits, tastes and abilities, what do I know – considering education, training, expertise and experience, and; who do I know – considering social and professional networks [***23***].

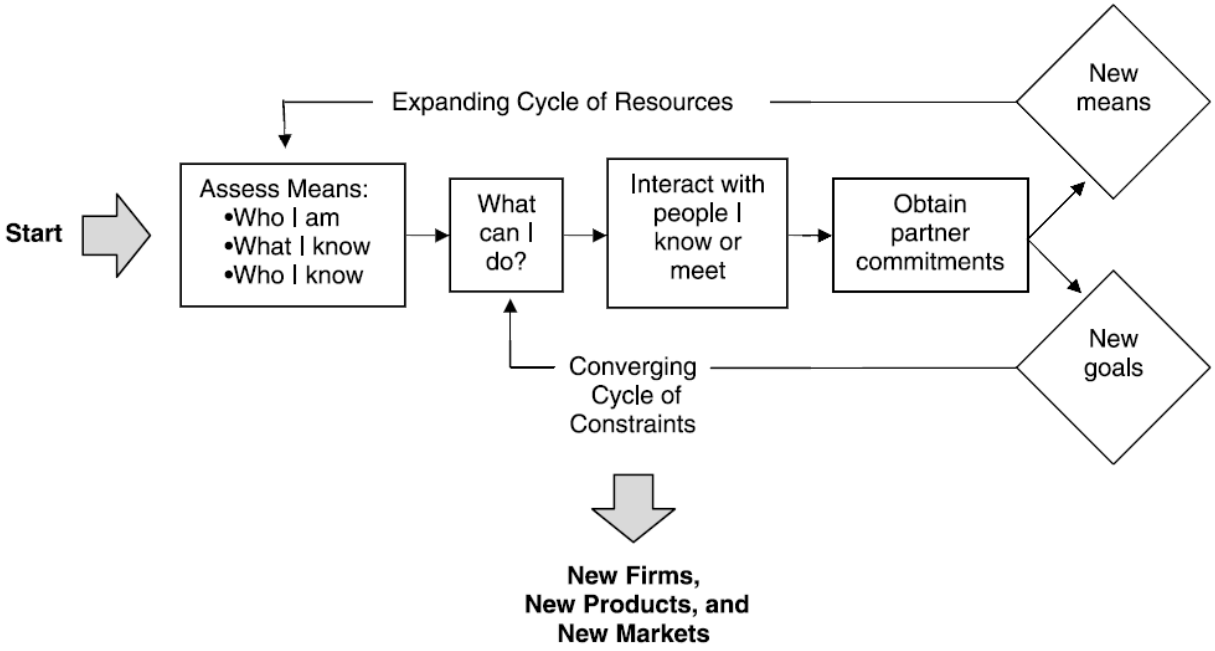



**Figure 6 – The effectual process [*25*] of an expert entrepreneur as visualized by [*24*].**

After assessing these means the entrepreneur determines what effects he can create with the means available to him. With these means and possible courses of action the entrepreneur can discuss the opportunities with possible stakeholders. Stakeholders that commit to the effectual process have two effects on the process; they bring new means to the table, as well as constraints. These constraints cause the whole process to converge into specific goals over time [***24***]. These specific goals get embodied in the end-result of the process resulting in a new product, market or firm [***23***].

After Sarasvathy proposed a paradigm shift in entrepreneurial research [***3***], effectuation became a topic of both education and research. Current research on effectuation will be discussed next.

**Effectuation research**

Kraaijenbrink contributes to the discussion on effectuation by criticizing the comparison of effectuation and causation [***26***]. Without going to deep into sociological theory, it is suggested that differentiating between these two paradigms based on only a handful dimensions is too easy. However, it is noted that the means-driven approach is a strong point of effectuation. But several differences between the paradigms mentioned by Sarasvathy in [***23***] are oversimplified [***26***]. Effectuation and causation are just two extremes in the spectrum of entrepreneurial behavior. Therefore, [***26***] suggests focusing on understanding the underlying nature of human action is more important for future research than differentiating the two paradigms.

Historically, paradigm shifts in research fields with low consensus have been slower than research into fields with high consensus. The research into entrepreneurship apparently is a field with low consensus, which means that the amount of research on effectuation is expected to grow slowly.

Few researchers have tried to model and test effectuation empirically. In a literature review on effectuation by [***27***] different reasons are mentioned why the amount of research on effectuation is not growing as rapidly as one would expect. The first reason is that effectuation represents a challenge to conventional entrepreneurial wisdom. On top of that, it is difficult to develop and validate measures for effectuation. In research by [***28***], attempting to link effectuation to new venture performance, difficulties arose measuring affordable loss to new venture performance. It was suggested, that measures for affordable loss still had to be developed. The research into effectuation is considered to still be in its infancy [***27***].

The application of effectuation is linked to entrepreneurial expertise. Experts in any domain solve complex problems more easily, more quickly and more accurately than novices within the same domain. Expertise is this sense can be acquired with time and deliberate practice. Linking effectuation to entrepreneurial expertise makes it easy to transfer effectual principles to other domains within the field of entrepreneurship.

Using expertise in entrepreneurship, effectual principles have been observed in new market creation [***25***], new firm creation [***29***], marketing [***24***] and investment decisions [***30***]. Later research has linked effectuation to innovative R&D projects [***31***].

But also outside the field of entrepreneurship, the paradigm shift suggested by effectuation has been noticed by researchers. This thesis follows after a paper from Reijers and Reymen [***1***], in which they suggested the use of effectual principles in the context of BPR. In that same paper they also noticed the similarities between effectual principles and principles of agile software development.

**Effectual principles in agile software development**

Agile software development methods were developed in a response to traditional inflexible and heavily regulated software development methods. Next, we will show the similarities between agile software development and effectuation.

Agile software development is classified as an adaptive approach used in a changing environment, focusing on staying flexible throughout the development process to be able to respond to unforeseen events. Opposite of adaptive approaches are predictive approaches, using planning to document the entire future development process.

In 2001, a group of software developers created the *agile manifesto* [***32***]*,* a statement to define what being agile entails and to determine key attributes of agile software development. In the left column of

Table 1 the four key principles of agile software development are shown. In the right column of Table 1, we have put corresponding effectual principles as introduced by Sarasvathy [***3***].

| Agile Software Development | Effectuation |
|---|---|
| *Individuals and interactions* over processes and tools | *Affordable loss and stakeholder interaction* over defined end-goal and maximizing efficiency using analytical tools |
| *Working software* over comprehensive documentation | *Moving directly into action* over elaborate planning |
| *Customer collaboration* over contract negotiation | *Strategic partnership* over competitive analysis |
| *Responding to change* over following a plan | *Leveraging contingencies* over exploitation of existing knowledge and prediction |

**Table 1 – This table shows the similarities between the four principles stated in the agile manifesto [*32*] and effectual principles [*23*].**

Both approaches focus on intensive stakeholder interaction and delivery of something without elaborate planning. Both agile software development and effectuation also advocate partnerships and collaboration. In [***33***] several agile software development methods have been evaluated of which two methods stand out: Dynamic Systems Development Method (DSDM) and Scrum.

DSDM is seen as a flexible approach which is able to adapt to the situation at hand. DSDM, like effectuation, focuses on the available resources and based on that determines what functionality can be implemented. Traditionally, software development methods focused on documenting required system functionality first, afterwards required time and resources are determined. Scrum focusses on being flexible, adaptive and productive. This approach uses small, time-boxed iterations and multi-disciplinary teams. Scrum uses intermediate goals to eventually reach the end-goal.

Now we have discussed literature on business processes and effectuation, additional fields of research have to be visited. One of the outcomes of this thesis will be a BPR methodology using effectual principles. We assume that organization culture has influence on the success of the use of this methodology and therefore we discuss organization culture types in the next section.

## *2.7 Organizational culture types*

In this section we will discuss a model for organizational culture described by Cameron and Freeman in 1991 [***4***]. This model was chosen among several other well-known organizational culture models of which Hofstede's cultural dimensions theory is one. The reason that the model of Cameron and Freeman was chosen is that the existing culture within an organization is easy measurable using the Organizational Culture Assessment Instrument (OCAI). On top of that it focusses on showing the difference between existing organization culture and the desired organization culture.

**Model of Cultural Congruence for Organizations**

Cameron & Freeman [***4***] use in their study on culture types and organizational effectiveness a Model of Cultural Congruence for Organizations (Figure 7). The model is based on the Competing Values Framework and consists of two dimensions. This model will be used to describe the four different types of organization culture.

The first dimension is internal or external focus. Internal focus means an organization strives to improve itself to better facilitate customers. With external focus the focus lies on the competition and competitive advantage [***34***]. The other dimension ranges from organic and flexible organization processes to mechanistic and predictable organization processes.

The first culture placed within these two dimensions is the *clan culture*. The clan culture has a friendly environment in which a sense of family dominates and teamwork is encouraged. People are connected through loyalty, tradition and interpersonal cohesion. The preferred leadership style for this culture requires a parent figure, viz. a mentor. Further, this culture focusses on developing human resources, emphasizes employee commitment and thrives on morale. The clan culture is internally focused and organic. This culture became well known during the 70s and 80s with success from Japanese companies employing this organization culture [***34***].

The second culture in the *hierarchy culture*, which fits within a formal, bureaucratic and structured organization based on internal rules and legislations. The desired leadership style in this culture is a coordinator and administrator. Employees are connected through rules, policies and procedures. Main strategy focus within this organization culture is stability and predictability. This culture is, like the clan culture, focused on internal maintenance and improvement, but due to rules and legislations is seen as mechanistic culture. McDonald's, which focusses on standardization and efficiency, is a good example of an organization employing a hierarchy culture [***34***].

The third culture is called an *adhocracy culture*. The adhocracy culture is an organization culture based

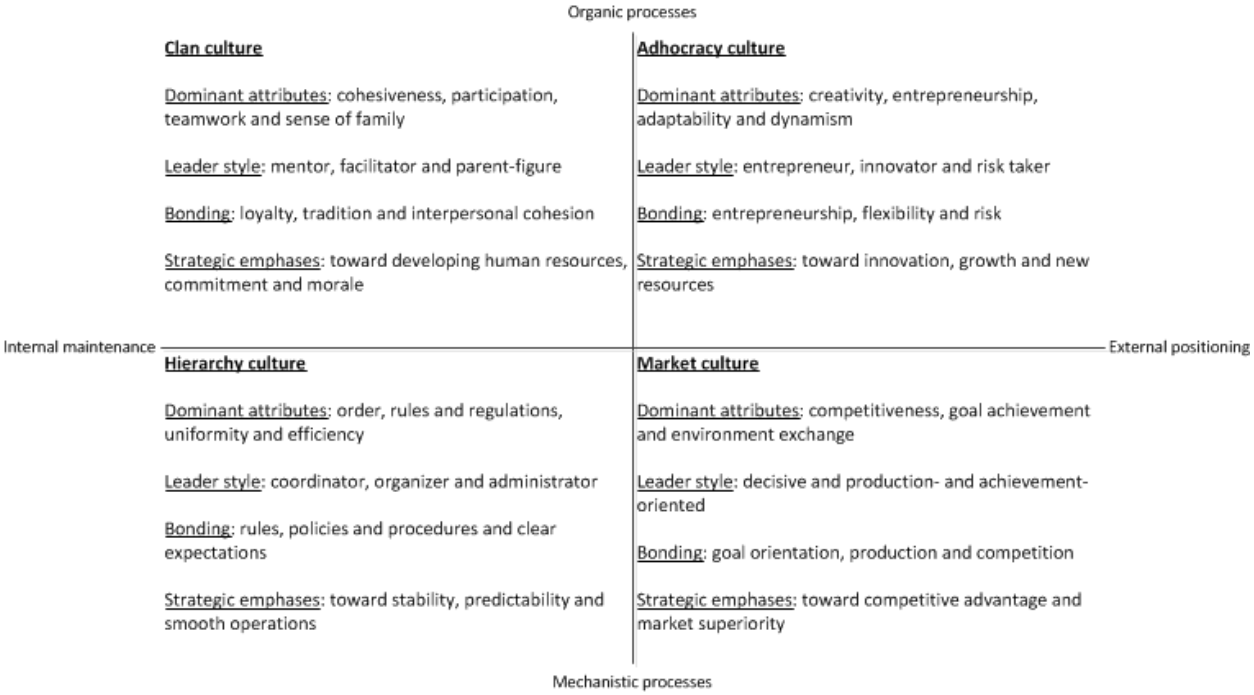



**Figure 7 – The Model of Cultural Congruence as discussed by [*33*].**

on creativity, entrepreneurship and adaptability. The desired leadership style for this culture is an entrepreneurial and innovative one. McGrath calls it the most important job of all for an entrepreneurial leader to create an environment in which employees search for new opportunities for the organization [***35***]. She also suggests that constraining this environment will give direction to employees. Employees are connected through flexibility, entrepreneurship and risk-taking. Main strategy focus is creating new resources, innovation and growth. Google is an example of an organization which employs an adhocracy culture [***34***]. Google encourages entrepreneurial action from their employees through the Creative Time Program [***36***]. Google's ability to react quickly on new developments allows them to obtain market share quickly.

The final organization culture described is the *market culture*, which has competitiveness and goal achievement as core attributes. A leader within this culture should be decisive and achievement-oriented. Employees are bonded through their goal orientation and competition. This culture focusses with its strategy on gaining competitive advantage and market superiority and thus has an external focus. An example for an organization employing market culture is General Electric, measuring performance of different departments based on market share [***34***].

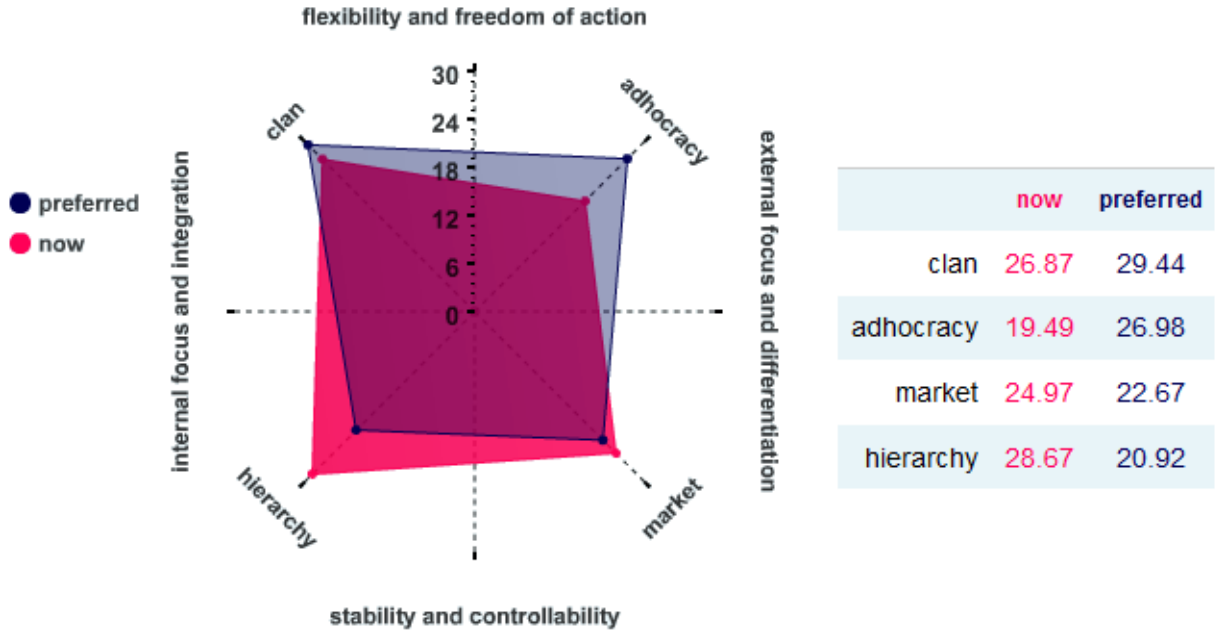
The research into different culture types set out to prove a connection between cultural congruence and organization effectiveness [***4***]. An organization's culture is congruent when its attributes and values all fit within a single culture of the four described above. No significant differences were found between organizations employing a congruent or incongruent organization culture. Next, we will discuss the Organization Culture Assessment Instrument, the test used to measure culture type within an organization.

**Organizational Culture Assessment Instrument**

The Organization Culture Assessment Instrument (OCAI) test allows inventorying of the existing organizational culture as perceived by individual employees, as well as what the preferred organization culture is.

The test described here [***37***] contained twelve questions, six about the current and six about the preferred culture within the participant's organization. Each question provides four situation alternatives and 100 points should be divided among the four alternatives. High number of points should be given to applicable situations, a low number to non-applicable ones.

As an example, Figure 8 shows the OCAI scores of the average Dutch organization based on 699 participants in the test. From this graph, we can deduce that there is a difference between organizational cultures as employed now and the desired culture. According to this sample, traits from a clan culture are already represented for a great part and participants would like to see even more. The opposite holds for traits of the market culture. The biggest gap between existing and preferred organization culture entails the hierarchy and adhocracy cultures. Apparently, within Dutch organizations employees favor a diagonal shift in which less hierarchical traits are employed and more properties from the adhocracy culture.




| | now | preferred |
|---|---|---|
| clan | 26.87 | 29.44 |
| adhocracy | 19.49 | 26.98 |
| market | 24.97 | 22.67 |
| hierarchy | 28.67 | 20.92 |

**Figure 8 – This figure shows the average OCAI score of Dutch organizations. The scores are based on 699 participants. (Source: http://www.ocai-online.com)**

Using the Model of Cultural Congruence for Organizations we will determine traits of a desired culture in which an effectual BPR methodology is assumed to fit best in section 3.4.

It is one thing to take organization culture into account; another is to actually measure how well employees accept a new methodology or new technology within their organization. In the next section we will discuss models to measure user acceptance.

## *2.8 Measuring user acceptance*

For this thesis we will measure user acceptance according to two proven models, the Methodology Evaluation Model and the Technology Acceptance Model 2.

**Methodology Evaluation Model**

Assessing whether a methodology will be accepted by prospective users can be done using existing questions prescribed by a proven model called the Method Evaluation Model (MEM) [***38***]; visualized in Figure 9. MEM contains the following constructs [***38***]:

- Actual efficiency: the effort required to apply the method.
- Actual effectiveness: the degree to which a method achieves its objectives.
- Perceived ease of use (PEOU): the degree to which a person believes that using a particular method would be free of effort.
- Perceived usefulness (PU): the degree to which a person believes that a particular method will be effective in achieving its intended objectives.
- Intention to use (ITU): the extent to which a person intends to use a particular method.
- Actual usage: the extent to which a method is used in practice.

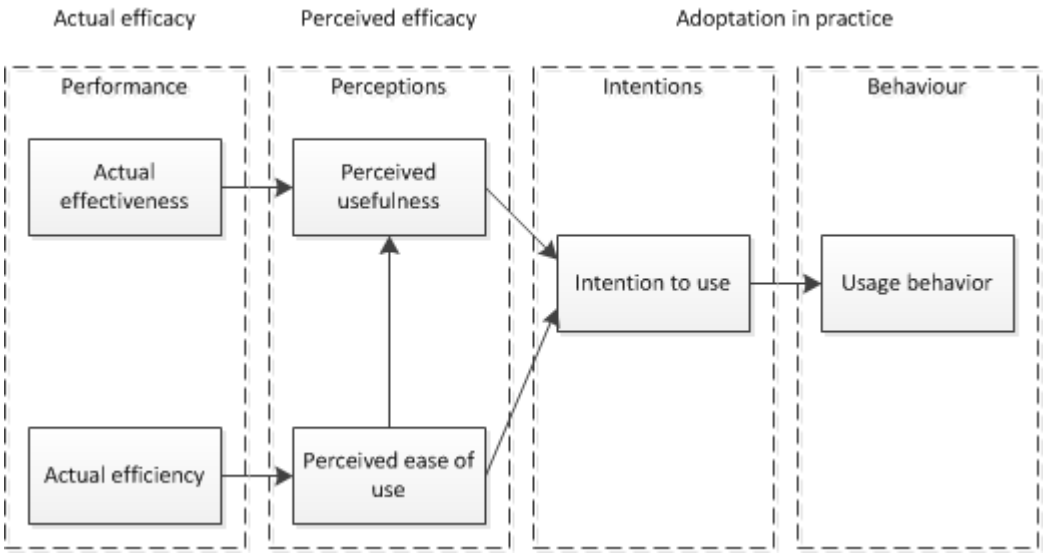



**Figure 9 – The Method Evaluation Model [*38*].**

In his paper [***38***], Moody introduced 16 questions to measure the different constructs of the MEM.

Next, we will introduce a model which will be used to measure technology acceptance.

**Technology Acceptance Model 2**

In 1989, Davis introduced the initial version of the Technology Acceptance Model (TAM) which can be used to measure the acceptance of computer-based information systems [***39***] within an organization. It is based on general model of human behavior and originally consisted out of 2 constructs: perceived usefulness and perceived ease of use. Perceived usefulness and perceived ease of use were theorized to influence the intention to use. The definitions of each of these factors are given below [***40***]:

- Perceive usefulness: the degree to which a person believes that the system will be effective in achieving its intended objectives.
- Perceived ease of use: the degree to which a person believes that using the system would be free of effort.
- Intention to use: the extent to which a person intends to use the system.

In 2000, Venkatesh extended this model with seven additional constructs [***40***]. This extended model is shown in Figure 10 and allows analyzing user acceptance in greater detail. Some constructs are greyed out to illustrate what constructs actually are used in the evaluation described in section 5.1. The additional constructs with their definition are given below [***40***]:

- Voluntariness: to what degree participants feel that the use of the system is non-mandatory.
- Experience: to what degree the users' perception on the system changes with increasing experience using the system.
- Subjective norm: to what degree the user thinks that others think he or she should use the system
- Image: to what degree the use of the system improves the user's status in the community.
- Job relevance: to what degree the target system is applicable to the user's job.
- Output quality: to what degree the system is capable of performing the tasks that matches the user's job goal.
- Result demonstrability: to the degree a user can understands why the use of the system might be beneficial.

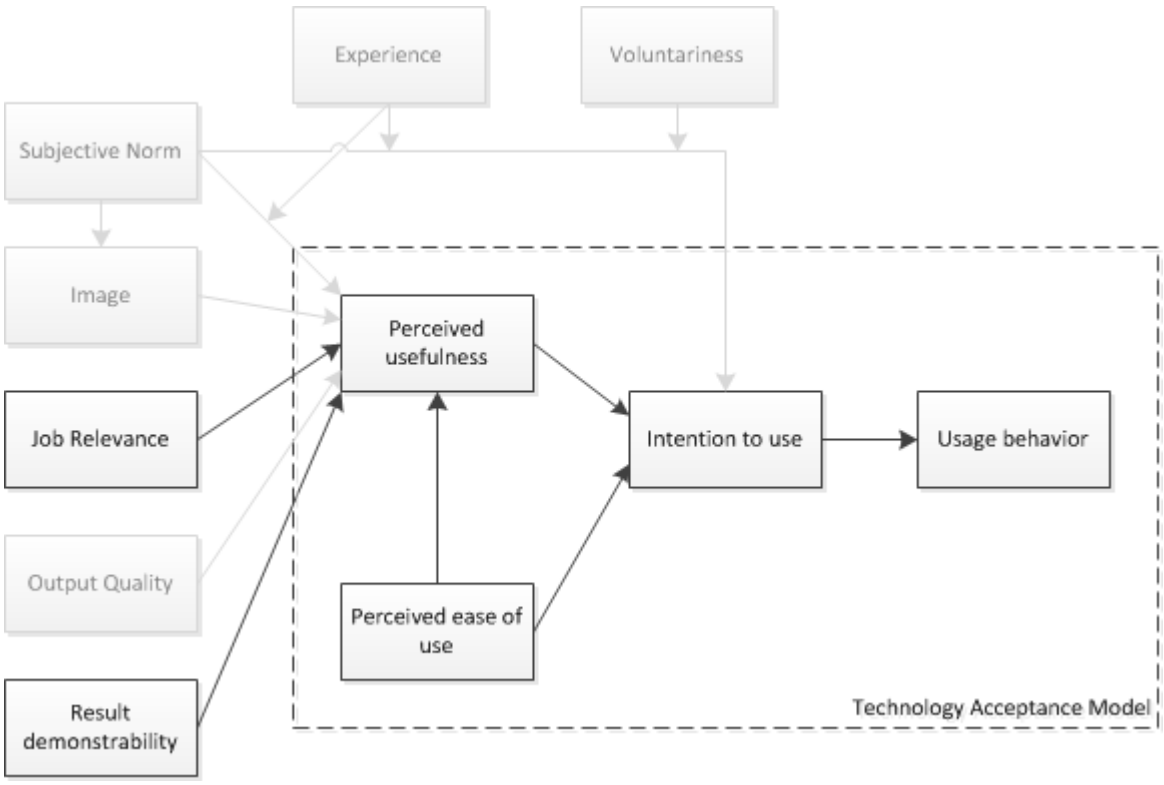



**Figure 10 – The Technology Acceptance Model 2 (TAM2) used for this evaluation [*40*]. The constructs which are not used within this thesis are greyed out.**

We have come to the end of the literature discussion. We have discussed business process redesign and participative BPR in more detail. We introduced PAWS as an example of a participative BPR approach. Furthermore, we handled the current trends in business processes: business process management and social BPM.

For this thesis we plan to apply effectual principles within an organization, therefore we have discussed effectuation and research into this topic.

We theorize that organization culture will play an important role at the introduction of a methodology within an organization. So we have discussed the different culture types that can exist within the organization according to Cameron and Freeman [***4***]. Finally we have introduced the models which will be used to actually measure user acceptance.

In the next section we will revisit the concept of business process redesign and will critically analyze what the current problems are which will be addressed in this thesis. Furthermore, we will determine how effectual principles can help solve these problems within a certain organization culture.

# 3 Analysis

BPR has been around for over twenty years now, but still many BPR projects seem to fail. The problem can be the initial expectations [***2***]: BPR is sometimes seen as the Holy Grail that might solve all your troubles. But also the way BPR projects are conducted can be blamed for project failure.

In this section we will first identify several problems of current BPR methodologies in section 3.1. After, we will theorize how effectual principles can help solve these problems in section 3.2. In section 3.3 we will discuss shortly how software is able to support a BPR methodology. Finally, we will discuss what organization culture is desired to harbor a participative BPR methodology using effectual principles in section 3.4.

## *3.1 Problems with current BPR approaches*

Since the introduction of BPR many methodologies have sprung into existence. This allowed researchers to analyze and compare the different methodologies as shown in section 2.1. From this research can be deduced that most methodologies follow a certain amount of steps, to get from initiation to implementation, and then stop [***2***]. This is a particular static and linear process [***8***].

Based on the disadvantages of this linear process, also generic methodologies using a cycle of steps are suggested [***41***]. The proposed cycles consist out of a fixed amount of successive steps to follow. The execution of steps in a certain order makes these approaches again inflexible, leaving not a lot of room for responding to unforeseen events. Imagine the requirements are changing during a BPR project which has been scheduled from begin to end. Not responding to a changing environment can mean budget-overruns, overdue projects and end-results which do not meet the then-current requirements [***2***].

It has been stated that BPR projects are often conducted based on a gut feeling [***42***] [***43***], and not so much on quantitative estimates. The problem in the former case is that significant investments are required, and all that based on a gut feeling which is a risk organizations have to take. The problem in the latter case is that tools en methods used to give estimates are mere predictions, which do not have to hold up in the end. On top of that BPR has always been identified as being extremely complex [***2***].

Best practices identify the human element as an important part of BPR, but most proposed methodologies do not include stages related to human requirements. Next to this problem, methodologies seem to restrain creativity and innovation [***2***].

We discussed in section 2.2 participative redesign approaches, which acknowledge the importance of stakeholder participation. However, this part is often limited to a particular step within the overall methodology [***2***] or additional training is required before stakeholders can actually participate [***9***].

In the context of BPM, if we take a look at Figure 3, activities in the BPM lifecycle are executed by two distinct groups of people. Decisions made within the design phase are based on data made available in the diagnosis phase. There is no, or only accidental, communication between process performers in the execution phase and BPR professionals active in the other phases.

Processes which do not fit the requirements eventually of those working within the process can face resistance within the organization [***2***]. This is for a large part caused by the top-down manner of

introducing new process designs. This resistance is additional to existing resistance to change, which is often caused by a lack of shared understanding amongst employees [***44***].

We discussed effectuation in section 2.6 which offers principles to stay flexible in uncertain environments. In the next section we will discuss how applying these principles in BPR can solve the problems discussed in this section.

## *3.2 How can effectual principles help in BPR?*

As mentioned in section 2.6, effectuation is placed opposite of causation with respect to flexibility. In that same section we discussed the similarities between agile software development and effectuation. Agile software development was a response to the traditional inflexible software development methods. Introducing effectual principles in BPR can help in developing a more flexible human-centered BPR approach. We discuss the theorized benefits below.

**Increased flexibility during execution**

Traditionally, goals of BPR projects would be set in an early stage, based on predictions, simulations and a gut feeling. Effectuation is instead of goal-oriented, means-oriented. A BPR methodology that uses effectual principles will not be bothered by setting goals in an environment in which so much cannot be predicted. Instead it would progress incremental using intensive stakeholder interaction and means available at that time to seek ways to redesign a process. Experimentation is the way to test possible solution directions with only small investments. Not committing to one direction at the start of the BPR initiative increases flexibility, allowing to leverage contingencies as they occur.

**Increased user acceptance through involvement**

The theory of effectuation contains the principle of strategic partnerships. An effectual BPR methodology would advocate interaction between stakeholders, both internal as external. Effectuation is means-oriented, and human capital is an important resource within organizations. An effectual BPR approach would leverage the knowledge possessed by the employees of an organization. Employees who feel appreciated for their input and are involved in BPR have an increased chance to accept change in the organization [***9***]. We also suggest to involving stakeholders would create a challenging environment to work in.

In the context of BPM, applying this approach would mean interaction between individuals active in the execution phase and individuals responsible for the diagnosis and design phase of the BPM life cycle. Diagnosis and design is traditionally conducted by people managing, measuring and improving the business processes in an organization. This results in more interaction between the different phases of the BPM life cycle as shown in Figure 11.

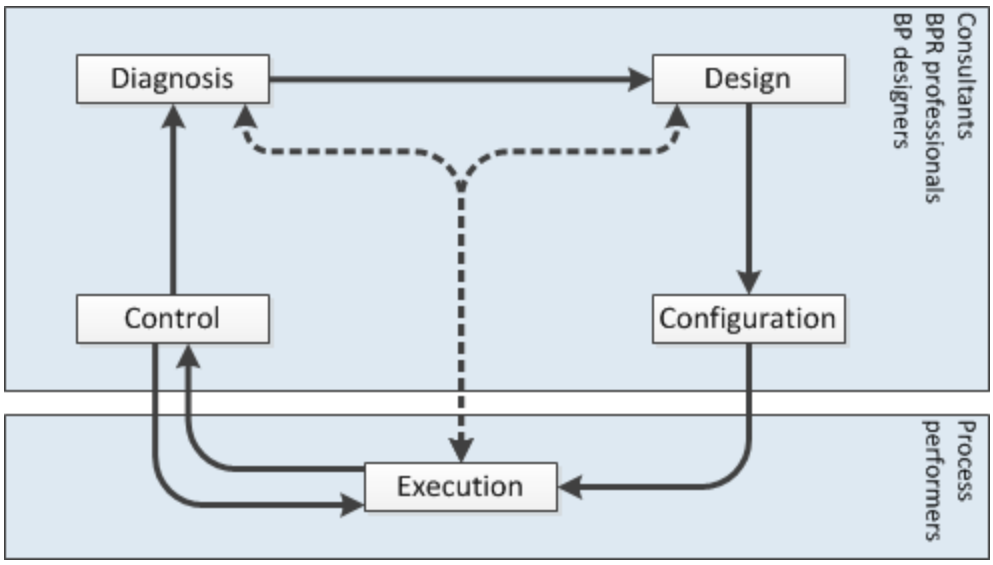



**Figure 11 – The BPM life cycle by [*13*] adapted to indicate additional interaction between phases. Intensive stakeholder interaction is expected to open up communication between individuals in the execution phase and diagnosis and design phase.**

The combination of flexibility that comes from using effectual principles and stakeholder involvement that comes with a participative approach decreases risk.

**Decreased risk**

Because of the intensive stakeholder interaction, the change acceptance is suggested to be increased compared to traditional BPR methodologies. The combination of increased flexibility during BPR projects and the increased possibility of change acceptance decrease the risk an organization has to take. Experiments would require only small investments; pursuing a gut feeling to redesign processes would thus mean low financial risk. Significant investment will only be required when success of a proposed solution is proven during an experiment. This is in line with effectuation which emphasizes control over prediction.

Furthermore, using affordable loss to determine what means are considered affordable in the worst case scenario, can limit the risk of the whole BPR initiative [***3***].

From this section, we can conclude that applying effectual principles in a BPR setting has several benefits. The question remains, how do we develop a BPR methodology using effectual principles (RQ1)?

Nowadays, it is hard to imagine an organization without systems to support its business. In the next section we will discuss what software would be able to offer in support of this methodology.

## *3.3 What does supportive software have to offer?*

As mentioned in section 2.3, business process management uses systems to continuously monitor, diagnose and adjust the business process during execution. Following this concept, social business process management was introduced to strengthen social networks existing within processes. From section 2.4, we can deduce that social business process management emphasizes collaboration in design and execution. In this section we build upon this knowledge to determine what software has to offer, supporting a BPR methodology. We identify four categories in which supportive software can be useful: documentation, communication, recommendation and execution.

**Documentation**

As we discussed in the previous section, intensive stakeholder interaction will be used to discuss ideas and problems within the current business processes. This interaction takes place based on knowledge on the business process and its environment. Supporting software can offer a location where this information is stored centrally and for anyone to see. Since this information is stored at a central place, there is only one location where it has to be updated by individuals responsible for providing this information. A wiki page is an example of a location where information and knowledge is documented [***45***].

Additionally, information can be documented on ongoing activities, which keeps users up-to-date on developments within the organization or the process.

**Communication**

Hosting a platform centrally to support the BPR methodology would create one place to go for discussions on an organization's business processes. Discussions during scheduled meetings or conversations at the coffee machine are not communicated to everyone in the organization. Translating these 'offline' interactions to contributions in a global discussion increases knowledge sharing amongst employees. In section 2.5 we have visited the topic of collaboration mapping, which can be used to structure discussions on complex issues.

A central place where employees can come together and communicate asynchronously can increase the number of social connections between employees within the organization. We theorize that existing social connections are helpful in forming teams.

**Recommendation**

Information technology has the ability process a lot of data in a limited amount of time. From the data that is available, a supporting system would be able combine information to recommend users a particular course of action. Supportive software is able to recommend users places to go, based on their inputs, for example history or preferences.

Often at the introduction of organization-wide systems, employees initially have access to vast amounts of data without a sense of direction [***46***]. The use of recommender systems will help users find relevant and interesting information within the large information space offered [***47***].

**Execution**

We imagine that software is able to support the execution of the methodology in two ways. First, software can be designed in such a way that it supports the process described in the methodology. This way, employees require no training to actually be part of the improvement projects. The software would guide the users through the methodology. This would lower the threshold to eventually start participating.

Second, supporting software would be able to give management an overview of the current state of affairs in applying the methodology. Computational power can be used to answer questions for management, which would take a significant amount of time to determine manually.

The question now remains, how exactly will a system, supporting an organization in applying an effectual BPR methodology, look like (RQ3).

We assume that organizational culture has great influence on the success of an effectual BPR methodology, and thus on the acceptance of software supporting this methodology. Therefore, in the

next section we will use the model we introduced in section 2.7, to deduce traits of a desired organization culture.

## *3.4 Desired organization culture*

When applying an effectual methodology in an organization, we theorize a certain working environment is needed to ensure communication channels are open and employees are valued for their opinions and contributions. In case this culture is not in place, management is responsible for creating such an open environment.

Unfortunately introducing change has proven to be difficult [***2***]. Through interaction and by bringing the right people on board and as many as possible, introducing change can be made less painful. Support from management in other parts of the organization can thereby increase and organizational resistance is expected to decrease. Once the first people are on board and actually work can be done, success stories can convince others to follow [***48***].

**Basis of desired culture**

The Model of Cultural Congruence for Organizations [***4***] will be used to deduce a description of the desired culture for this approach to work.

First, following a top-down approach, we will determine the main culture which would fit the approach best, based on the two dimensions discussed in section 2.7. We then extend this culture with values and valuable attributes from other cultures. Research has pointed out that there is no difference in performance between organizations that employ one single culture or a mix of traits from different cultures [***4***].

Business processes serve a particular internal or external customer. An external orientation would require taking a look at business processes and services provided by competitors and then try to copy successful implementations or try to actually differentiate from those processes making your organization unique. Since effectuation stresses not to focus on competitive analysis this external orientation does not fit. The focus on business processes and improvement thereof requires an internal orientation. An internal orientation would focus on executing the business process as efficiently as possible. Note that an internal orientation does not mean that no external individuals or organizations can be employed. On the contrary, using external sources still fits within this culture description as long as the focus lies on improving own unique business processes.

The other dimension we need to take a look at is if an effectual approach would fit best within organic and flexible or mechanic and static organization. In short, effectuation focusses on staying flexible to easily respond to unforeseen events. This seems to point into the former, organic, organization culture. A mechanic and static organization culture does not match with an entrepreneurial methodology.

Based on the choices within the two dimensions it seems that the *clan culture* would fit best as the basis for the desired organization culture. As indicated before, the clan culture is characterized as an open and friendly place to work [***34***], based on employee participation, commitment and mutual trust. Next, we will take characteristics of other organization cultures to expand the desired culture description. We do this because traits from other cultures might have beneficial effects on the execution of the methodology.

**Traits from other organization culture types**

Effectuation is a theory of entrepreneurial expertise, therefore traits from the adhocracy culture are assumed to be beneficial. For example, creativity and entrepreneurial focus advocated by the adhocracy culture can encourage employees to participate.

A leader in a clan culture is a mentor, but to actively motivate people into participation additional qualities are assumed to be necessary. The preferred leader should be an internal-oriented entrepreneurial mentor motivating his employees to rethink their work and inspire them to take action. This leader should understand effectual principles to properly lead participants the way in the execution of the BPR initiative.

The aim for efficiency and smooth operations from the hierarchy culture would also fit within the desired culture. The focus in BPR projects should be efficiency and the proper handling of exceptional process behavior. Figure 12 displays the additional traits that we assume that are needed on top of an existing clan culture.

Let us revisit the example given in section 2.7 in Figure 8. Although not trait-specific, on average, Dutch organizations employ an organization culture based mainly on the clan and hierarchy culture. However, on average all four organization culture types seem to be represented within an average organization. From this, we suggest that most Dutch organizations would have no hard time introducing the methodology, since a basis of either organizational culture is already in place.

The introduction of the methodology itself might cause a shift in the existing organization culture for, for example, some organizations which do not encourage entrepreneurial thinking or focus on smooth operations of business processes.

The culture described here does not necessarily have to exist in the whole organization. It is possible that the culture exists as a subculture within the organization, e.g. within a single department. Using this knowledge, we assume that the approach might be applicable within every organization culture as long as it nurses a subculture close to the described culture.

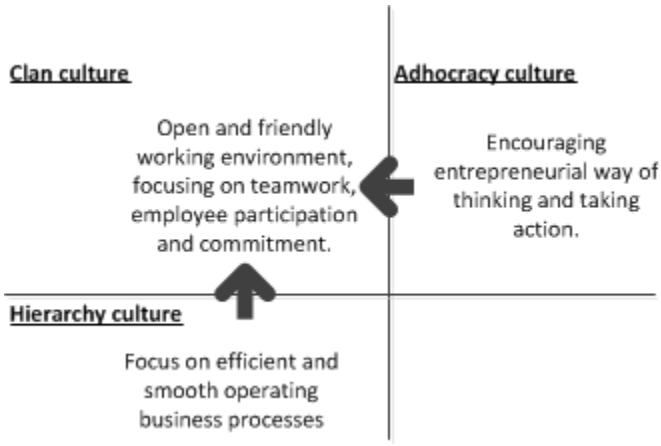



**Figure 12 – This figure summarizes the important traits of the desired organization culture.**

In this thesis we will develop an effectual BPR methodology. Also, we will describe a collaboration platform that supports the methodology and the organization in applying the methodology. With organizational culture in mind, the research questions remain; will an effectual BPR methodology be accepted by prospective users (RQ2) and will a supporting platform be accepted as a valuable addition by prospective users when applying an effectual BPR methodology (RQ4)? This is what we will measure during the evaluation period described in section 5.

In this section we discussed existing problems within current BPR methodologies. After, we discussed how effectual principles can have beneficial effects on BPR projects. We have shown that using effectuation opens up additional communication channels between process executors and individuals responsible for redesigning the business process. We discussed briefly in what ways software can support the methodology. Finally, we deduced an organization culture which is assumed to possess properties to harbor an effectual BPR methodology.

In the next section, we will describe the design of our effectual BPR methodology. Also, we will describe a collaboration platform supporting this BPR methodology.

# 4 Design

In this section we will introduce a BPR methodology based on effectual principles. In section 4.1 the effectual BPR methodology will be discussed. Section 4.2 is reserved to discuss the effectual collaboration platform which supports organizations in applying the methodology.

## *4.1 The effectual BPR methodology*

Section 4.1.1 is dedicated to the design of an effectual BPR framework. In section 4.1.2 we will explain parts of the methodology in greater detail.

### 4.1.1 Design of the framework

This section will be used to explain how the effectual business process redesign framework came to be. We will first clarify that why use the S-A framework [***8***] (introduced in section 2.1, Figure 1) as a basis. Then, we explain what parts are or are not applicable in describing an effectual BPR approach.

**S-A framework as a basis**

The S-A framework was a result of studying methodologies from leading reengineering consulting firms. The framework describes the different stages of a general BPR effort. Now, it is important to determine what parts are unavoidable in a BPR project, and what has to be changed in order to match the effectual paradigm.

The envision stage is an important part of the S-A framework in which the impetus is given for the whole BPR initiative. Discovering redesign opportunities and identifying IT levers are activities within this stage [***8***]. However, these activities constrain possibilities early, which is not in line with effectuation.

McGrath uses the term *Ballparking* to remove uncertainty from the entrepreneurial environment by specifying what opportunities are looked out for. We will adopt the term Ballparking for removing uncertainty, but will use it differently to avoid constraining opportunities. In the effectual BPR methodology, Ballparking will be used to describe the environment of the business process and the process itself. The environment of a business process can be rules and legislations, trends, required certification and available means, for example. Proposing improvement suggestions top-down can be used as fuel to overcome the cold start problem [***49***]. The cold start problem occurs when lines of communication are wide open, but no individual wants to take the lead starting interaction. This is the first step in changing the general S-A framework to an effectual BPR methodology (Figure 13).

The initiate stage of the S-A framework encompasses the setting of goals, planning and creation of teams. These activities do not fit an effectual approach. The diagnose stage is used to analyze and document the current situation of the process. However, in an effectual BPR methodology over-analyzing the current situation is something to be avoided. We propose that both the initiate stage and the diagnose stage as described in the S-A framework should be replaced with a more effectual way of taking action.

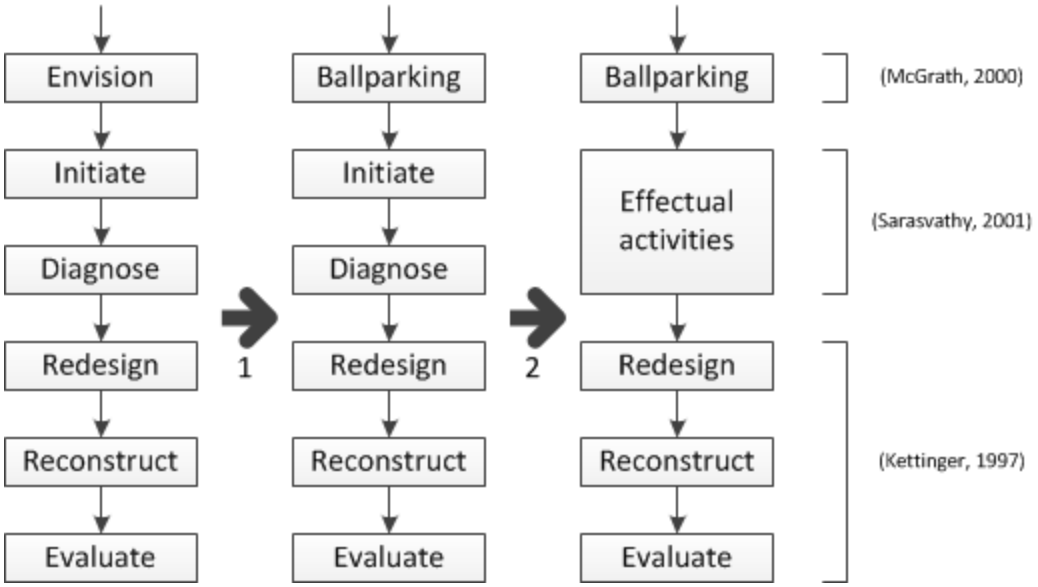



**Figure 13 – The steps taken to eventually design an effectual BPR methodology. The end-result is shown in Figure 14.**

The redesign stage, reconstruct phase and evaluate phase identified in the S-A framework are necessary steps to be taken at the end of a BPR project. These stages encompass the detailed design, the actual implementation and linkage to continuous improvement programs of the organization [***8***]. These steps are time-consuming and require significant investments.

Applying an effectual BPR approach, experimentation provides answers to what degree redesign possibilities are beneficial for the business process without committing to a particular direction on beforehand. This experimentation takes place before the redesign stage, using iteration and intensive stakeholder interaction from the theory of effectuation. So, before moving to a time and money demanding path, experiments have shown the direction is worthwhile. Placing the effectual activities within the general S-A framework was the second step of the design (Figure 13).

Originally, analysis of improvement opportunities was conducted in the redesign phase. However, analysis is not conducted at the end of experiments. This means that activities left to be executed in the redesign phase focus on detailed design.

Now we will in discuss in greater detail how the effectual activities are filled in.

**Effectual activities**

For this part we revisit the effectual framework developed by Sarasvathy [***3***], shown in section 2.6, Figure 6. There are actually two cycles existing in the effectual framework. One cycle is responsible for intensive stakeholder interaction and commitments. This cycle produces new means and goal directions. Another cycle is responsible for the actual creation of new firms, markets or products.

For the effectual part of the effectual BPR methodology presented here, we again use two cycles (visualized in Figure 14). Effectuation advocates stakeholder interaction and also in this BPR approach, we consider the redesigning of processes a social event. One cycle will contain again intensive stakeholder interactions about the business process and the improvement thereof. This is closely related to what proponents of participative BPR approaches have suggested. Eventually, these interactions result in improvement opportunities.

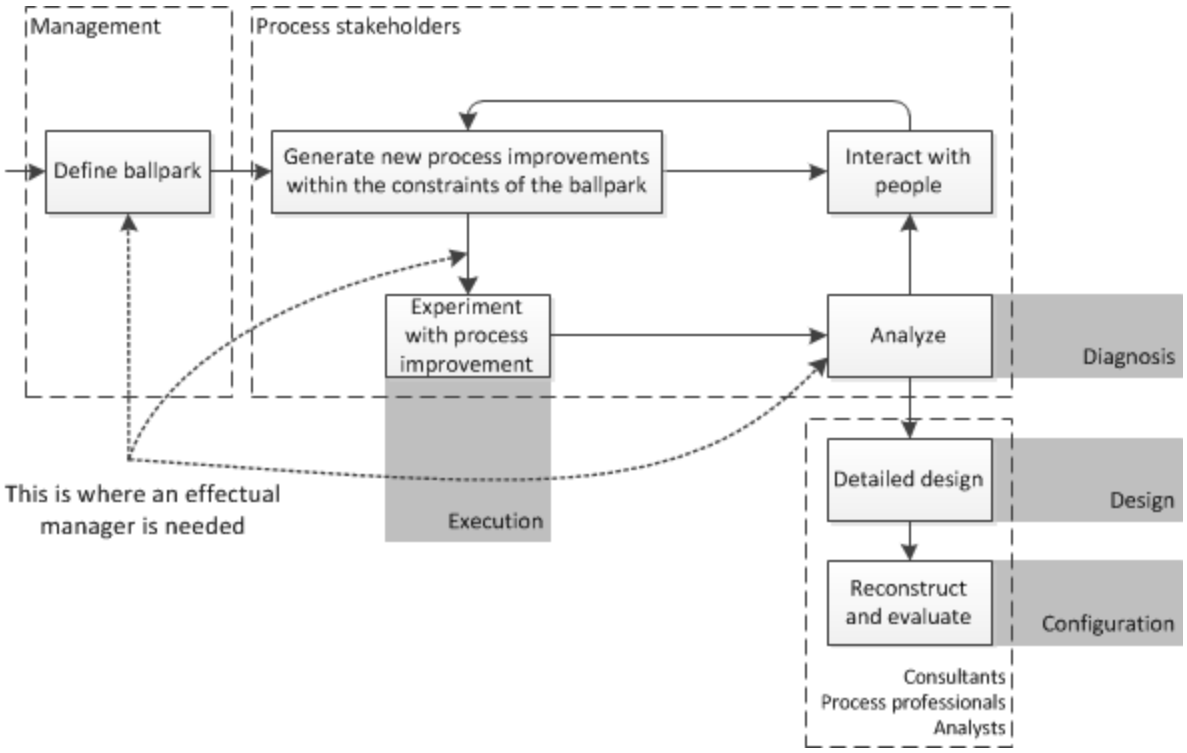



**Figure 14 – An abstract representation of the steps within the effectual BPR methodology. Grey markers show what particular steps of the methodology happen in what phase of the BPM lifecycle (Figure 11).**

The second cycle is related to the cycle existing within the entrepreneurial effectuation framework, where a converging cycle of constraints eventually results in creation of a new artifact. In the effectual BPR methodology this cycle will be responsible in experimenting with the improvement opportunities suggested in these interactions. Experimentation is an important trait of effectuation in entrepreneurship. Experiments in turn can lead to actual organization-wide implementation of improvement opportunities. If not, knowledge gained from the experiments can be used for further discussion.

**Effectual management**

In section 3.4, we have deduced a desired organizational culture. In this desired culture a certain type of leader, or manager, is required to support this effectual BPR methodology. It is not the traditional manager, who carefully plans, determines goals and analyzes improvement opportunities on their expected returns [***23***]. We suggest an entrepreneurial manager who supports the effectual BPR methodology and inspires employees to participate and take action. In case a more traditional manager is responsible for the improvement of an organization's business processes, we suggest the introduction of an intermediary. This intermediary then picks up the role of *effectual manager*, guarding the improvement process as specified in this BPR methodology.

The effectual manager we deemed necessary for this effectual BPR methodology to succeed has its major responsibilities at three points in the improvement process (see Figure 14). First, we require him to be present when defining a ballpark. Second, he is responsible for deciding what improvement suggestions are ready to be experimented with. And finally, he is responsible for interpreting the experiment results.

**To summarize**

A result of this section is an abstract representation of the proposed effectual BPR methodology. This representation is shown in Figure 14. It starts with a ballpark, describing the business process and its environment. Within this ballpark, one cycle describes stakeholder interactions resulting in business process improvement suggestions. The second cycle contains experimentation with suggested process improvements. The results of these experiments are fed back to the cycle to be further discussed. In case of successful experiments, organization-wide implementation can follow. For implementation the last three stages of the S-A framework are used. Note the analyzing an improvement suggestion does not happen in the redesign stage anymore, since experimenting with the suggestion already provided the necessary information. Therefore, since the focus is only on documenting the design, this stage is renamed to detailed design.

In the context of BPM and the BPM life cycle, Figure 14 shows that there is indeed additional communication between individuals active in the execution and diagnosis stage. Next we will discuss the framework in greater detail.

### 4.1.2 Description of the framework

Effectuation emphasizes the use of means at hand. In the context of business processes, existing business processes are part of those available means. Therefore, the methodology described here will be classified as an *evolutionary BPR approach*. This means that existing processes will be used as a basis for further development. In contrast, revolutionary approaches favor to start from scratch and are therefore also called *clean slate approaches*. BPR projects which are conducted following a revolutionary approach are extremely radical.

Human resources are one of the most important, if not the most important, resources an organization possesses. In line with effectuation and affordable loss, this BPR approach advocates the use of already available human resources within the organization. In section 2.2 we discussed participative BPR and section 2.3 we showed a representation of the BPM life cycle created by [***13***]. The effectual BPR methodology can also be classified as a participative methodology which adds additional communication channels to the BPM life cycle. This will become clear from reading this section. We have discussed the concept of social BPM (SBPM) in section 2.4. The effectual BPR approach described here is closely related to SBPM, because it allows process performers to give feedback on the process during runtime.

This section is dedicated to explain the effectual BPR methodology in more detail, starting with the concept of ballparks.

**Ballparks**

In this effectual BPR methodology we have adopted the term *Ballparking* which is used to remove uncertainty amongst employees. In a ballpark we describe and clarify the workings of the selected business process and the environment it operates in. A ballpark should not be used to constrain possible improvement opportunities, since that would not be effectual. But, we use a ballpark to communicate the current situation to all stakeholders. Constraints enforced by the environment can of course be documented within a ballpark.

To operate effectual, we recommend not spending too much time on mapping the current situation since the focus should be on taking action. So, if there are process models visualizing the current situation, use them to explain the process. If there is someone that knows the full workings of the process, let him describe it the best he can so everyone can get up-to-date on how the process works. We suggest a minimum amount of information that is required: it should be clear what the function of

the process is and what is expected from the execution of the process and its end-result. In line with effectuation [***23***], the description of the environment should also be stated what resources are available and seen as affordable loss in pursuit of process improvements.

Within a ballpark, stakeholders of the business process are invited to discuss possible improvements. Stakeholder interaction is discussed next.

**Stakeholder interaction**

Within these ballparks, employees working with the particular process are invited to discuss possible improvements with their peers. For an employee to propose his improvements 'to the public', it will require some entrepreneurial spirit. Individuals can participate in this discussion based on their own skills and past experiences. This situation is similar to the situation an effectual entrepreneur faces in the beginning. Identifying opportunities answering the questions "who am I?", "what do I know?" and "who do I know?".

Using the effectual mindset [***24***], it does not stop with internal connections; also external connections can be used to harvest ideas or receive feedback from. Examples of external connections can be parent or sister organizations, but also customers, suppliers and maybe even competitors. It also cannot hurt to discuss ideas or problems at birthday parties or other social events. We suggest that people operating within a different domain can shed a totally different light on the perception of the problems or ideas. The freedom for entrepreneurial actions requires a certain organization culture or subculture which allows this. In section 3.4 we have theorized what cultural traits are desirable in an organization where this BPR methodology will be used.

A general question will be asked to give impetus to the whole discussion: "*how to improve this process?"* with the information contained in the ballpark kept in mind. We suggest that, given the ballpark, and asking employees on how to improve their process can already give employees reason to discuss the opportunities.

However, it cannot hurt to propose already some improvements or questions, to overcome the cold start problem [***49***]. Time and money is spent on developing a platform and when introduced, nobody uses it. In this sense, a platform does not have to be a technology. Another example is providing a stage, like a white board in some central public office, in which the discussion can be conducted asynchronously. It also does not have to be the case that immediately all employees are invited at once to join the discussion. Starting from a small group with a few dedicated people, and letting the fire spread naturally can work as well. In his book on introducing Scrum, Cohn [***48***] suggests this approach of starting small is an inexpensive and low-risk way of introducing a new concept.

Stakeholder interactions should eventually result in process improvement suggestions. Suggestions which are ready to be experimented with are selected by an effectual manager. The experiments are conducted within a project.

**Projects**

An effectual manager operating within this methodology experiments with improvement suggestions, without over-analyzing the opportunity on beforehand. He starts by bringing the right individuals together in a project. We identify three interesting groups of people to involve in a particular project:

1) the individuals proposing and supporting the improvement;
2) individuals with certain skills or experiences required for the project to be executed; and
3) individuals which are affected by the proposed improvement

We suggest that the effectual manager, together with the newly formed project team, should determine how the improvement of the process can be measured eventually. Improvements in the process can be measured in terms of time (e.g. throughput time), quality (e.g. quality of end-product), cost (e.g. costs of executing the process) and flexibility (e.g. number of exceptions) [***50***]. In an organization which already monitors performance of business processes it can be easy to measure changes in the process. We theorize it depends on the radicalness of the improvement to what degree monitoring tools should be further configured.

In line with effectuation [***24***], the experiments conducted within these projects should be characterized by requiring only a small (or no) investment and a small amount of team members. This means that these projects pose low risk for the execution of original process while the experiment is conducted or, in the worst case, if the experiment fails. In comparison, big BPR projects which have been carefully planned require significant investments and cannot guarantee to meet the requirements upon delivery.

The individuals that are responsible for proposing the improvement can be considered the pioneers of this improvement; having a certain vision on how the process can be improved. We make these people responsible for communicating the new way of executing (part of) the process to other project members.

We suggest that if certain required skills for a project are not provided by existing project members, these skills should be filled in by getting additional stakeholders on board. For example, it can be the case that results of this process improvement can only be properly measured by a process analyst, while all current project members are financially educated. Advertising internally is a possibility to attract people to your project. It is important additional project members are supporters of the proposed improvement. Otherwise, this can result in a dysfunctional team [***48***].

A dysfunctional team might cause the project to fail, without it ever having a chance to succeed. It is important to involve some of the individuals affected by this improvement; they can provide valuable insights and feedback on the proposed improvement. Involving them in the improvement process also increases the acceptance, in case the improvement will be implemented organization-wide [***2***].

Eventually, a project which is started at some point will end at some point. When a project ends, and what to do when it does, will be discussed now.

**Project results**

A project can end in several ways. The first is because of a predetermined deadline. A second is when the resources made available for this project have run out. Finally, the improvement suggestion can have proven to deliver the desired results and organization-wide implementation follows.

Deadlines can be used to time-box the experiment, looking at time as a resource which eventually runs out. Time-boxing iterations within a project can help determining when a project is doomed to fail or to succeed quickly [***48***]. Time-boxing is used also in the agile software development method Scrum.

For this BPR methodology, either way should be determined if the improvement that was experimented with had beneficial effects on the execution of the process. The way of measuring process improvement is, as mentioned, something that should be determined at the start of the project.

At the end of a project, different paths can be taken. Information gained during and after the project should in any case be used for future reference; results can be fed back to the ongoing discussion. A project can be discontinued because it did not have the desired effects on the execution of the process. Or because the proposed improvement had such great effects on the process that global

implementation will be scheduled. In between those extremes can be decided that the project will be put on hold until further discussion has fine-tuned the proposed improvement.

When the improvement has a beneficial effect on the execution of the process global implementation can be realized. As mentioned, normally BPR projects can be extremely complex, but since the change already has been implemented on a small scale most practical information is already known. Also, by using this incremental approach, the complexity of the implementation is relatively low. After a successful project, certain amounts of steps need to be executed in order, namely detailed design, reconstruction and evaluation [***8***].

**To summarize**

The presented BPR methodology uses traits from both participative BPR and SBPM, as it creates an environment in which business process executors are able to give feedback on the process and suggest improvements during runtime. The presented methodology creates additional communication channels in the BPM life cycle between the individuals responsible for executing the process and the people responsible for monitoring and adjusting the process where needed.

One can argue that these small incremental improvements can cause sub-optimization of the process, but due to the openness of the discussion on these improvements we expect that the overall quality of the process is kept in mind.

In this methodology no phase is included which deals with training the participants in what processes are. The reason is that for this methodology to work an organization, we assume they should already be process-oriented. In order to improve these processes, employees should be aware of what they are part of. This can prove to be a difficult task by itself and depends on the existing culture of the organization.

In the next section we describe the effectual collaboration platform. This platform is implemented to guide and support the effectual BPR methodology.

## *4.2 The effectual collaboration platform*

In this section we will explain how the effectual collaboration platform supports the effectual BPR methodology presented in the previous section. We will start with the act of *Ballparking*.

**Ballparking**

The effectual collaboration platform supports the functionality of the ballpark in the BPR methodology presented in the previous section. Within a ballpark, different aspects can be described to explain the environment in which the business process can be improved. Firstly, the collaboration platform hosts a description of the process and its environment. Secondly, resource management allows management to specify what resources are directly available within the ballpark (Figure 15). These resources can in turn be assigned to different projects experimenting with different improvement suggestions. This information serves as a type of wiki page [***45***], already proposed to be used in BPR projects [***51***], in which management and other users with proper rights can alter the information when needed.


**Figure 15 – The system allows management to describe intangible resources. The inventory of tangible resources is also supported.**

The interactive part of the platform's ballpark contains the deliberation map, a concept we introduced in section 2.5. The deliberation map facilitates interactions amongst stakeholders of the process described in the particular ballpark.

### Stakeholder interaction

The effectual BPR methodology emphasizes intensive stakeholder interaction, which is supported by the effectual collaboration platform in different ways.

For starters, the effectual collaboration platform supports the sending of messages between different users on the platform. The reason for this is that we think not all communication has to be public. Furthermore, messages are used to stimulate additional interaction between stakeholders by updating users on changes in posts they have been active in before. These features are similar to what is used in the social network site Facebook [***52***]. Figure 16 shows the functionality offered by Facebook and how the collaboration platform adopts this functionality.

Sending updates on previous posts users have been active in, stimulates revisiting older but updated posts and thus the overall activity of the platform.

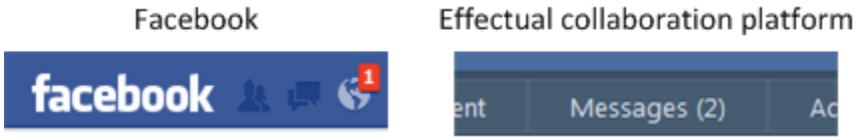



**Figure 16 – In the effectual collaboration platform, features are adopted from the successful social network Facebook [*52*]. Messages are used to inform users about updates in discussions they have been active in before or to communicate between users.**

The main interaction on the collaboration platform happens within the deliberation map. What a deliberation map is, we have discussed in section 2.5. The deliberation map we have used was based on the implementation of the Deliberatorium [***20***].

Figure 17 shows part of the deliberation map as how it is implemented in the effectual collaboration platform.

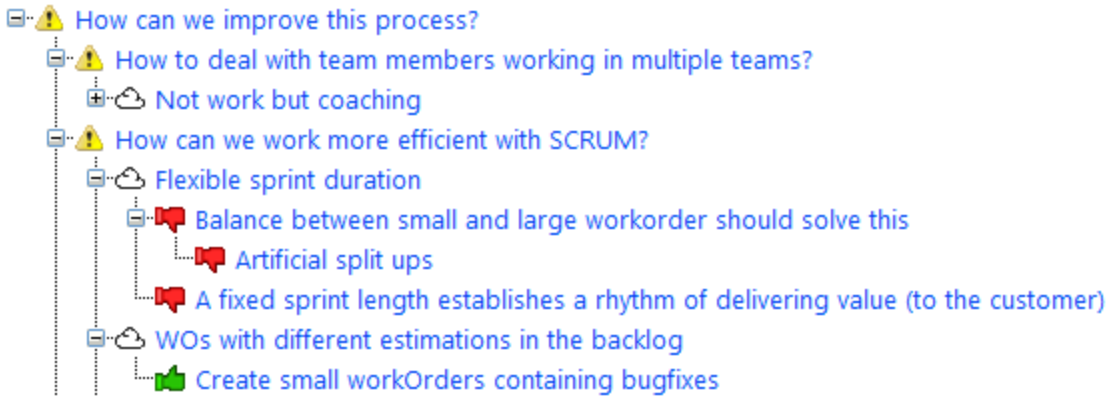



**Figure 17 – A part of the deliberation map that was created in the ballpark. The "Not working but coaching"-idea is collapsed meaning that the sub-tree has not been active for several days.**

Compared to the Deliberatorium we have implemented two additional features. The first feature is the automated collapsing of inactive branches in the deliberation map. Automatic collapsing provides a cleaner overview than when inactive branches are still prominently present. In Figure 17 for example, the node "Not working but coaching" is collapsed because none its descendant nodes have been active for a certain amount of time. Of course inactive branches can still be accessed by expanding the branch. This allows for stakeholders to revive older discussions if necessary.

The second addition is a concept we call *dangling deliberations.* Dangling deliberations are ideas or problems which do not yet fit within the ongoing discussion in the main deliberation map. We theorize it is important that users of the collaboration platform are not too limited by the template enforced by the deliberation map. It can be seen as a pin board, where users are able to pin their contributions until they can be placed within the main discussion. These contributions can already be discussed among users. Later, these independent branches can be moved into the appropriate part of the main deliberation tree.

As in the BPR methodology, it is important to bring the right people together in order to experiment with improvement suggestions that result from stakeholder interaction.

**Bringing the right people together**

The result of effectual entrepreneurship depends on what stakeholders are brought together. In section 4.1.2, we identified three groups of individuals who are recommended to be in an improvement project. The collaboration platform will use recommendation to suggest interesting posts and projects to users, and vice versa.

Within the collaboration platform, user profiles are used to identify different users. These user profiles are used to recommend a particular user places to go, or recommend this user for projects. Part of a user profile is keywords matching users' skills or experiences. These keywords are added to a user himself. We acknowledge that this type of self-assessment is susceptible bias as mentioned by [***53***], further development of the collaboration platform should investigate other options.

In the collaboration platform, keywords are used for several reasons. For the user, based on his keywords, the system will suggest posts in the deliberation map from other users. We suggest that bringing these individuals together will increase the quality of contributions, since they will be peer reviewed. An idea of one expert in a certain domain might be questioned by another individual with experience in that same domain. We theorize that suggesting contributions of others will have a positive effect on the activity of the discussions.

Also for projects the collaboration platform uses keywords for additional recommendations. The project page itself, can be considered a wiki page documenting the project description, the available resources, the approach which is used to experiment and how the project will be evaluated. Recommendation for project members occurs at the creation of the project, as well as during the forming of the project team.

When creating a project, the individuals responsible for creating the project are able to specify which branches of the deliberation map the project is based on. Using these branches the system will recommend users based on the contributions in the selected branches (see Figure 18). From the list of suggestions, it is for project management to eventually decide what people have proven to be valuable for the experiment. The collaboration platform will aid in this decision by summarizing data on the amount of contributions and how the user's contributions were rated on average.

After a project has been created, projects can be assigned certain required skills or experiences in the form of keywords. Projects with matching keywords with respect to a users' profile will be suggested to that particular user. These keywords will also be used to support project member management.

Figure 19 shows part of the project page, where the collaboration platform displays the required skills and experiences for a particular project against the skills and experiences that are provided by current project members. When there is need for additional project members, project management can invite users to commit to this project. The collaboration platform can be used to suggest members with respect to the contributions the project is based on, but also keywords are used to find possibly useful users. How commitments are supported in the collaboration platform is discussed next.

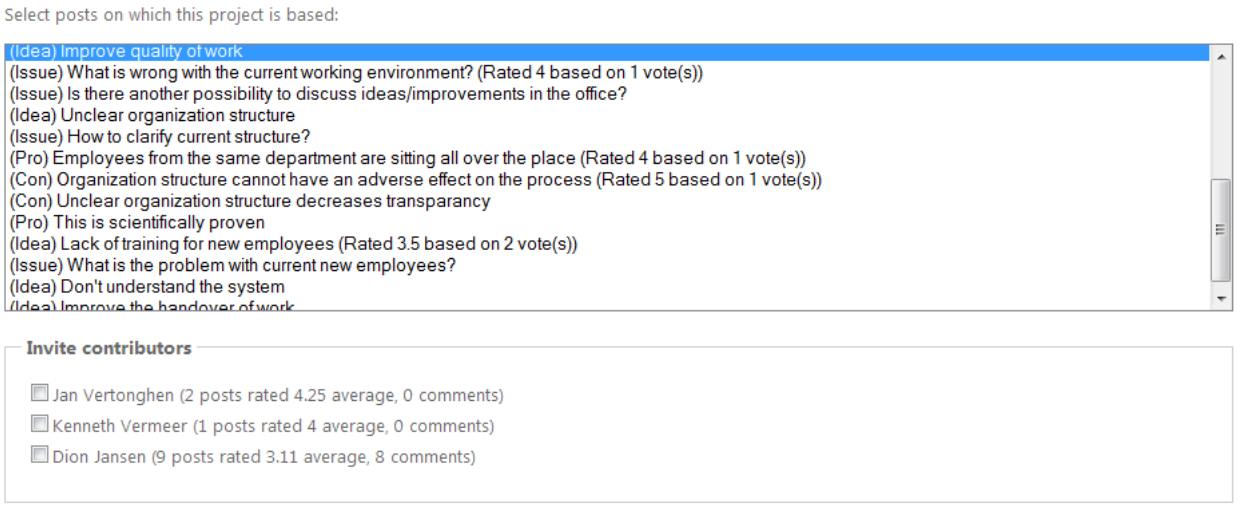



**Figure 18 – The improvement of the quality of work is selected here as the branch on which this project is largely based on. Apparently three individuals have contributed in this branch. The ordering of this list is based on the quality of their contributions.**

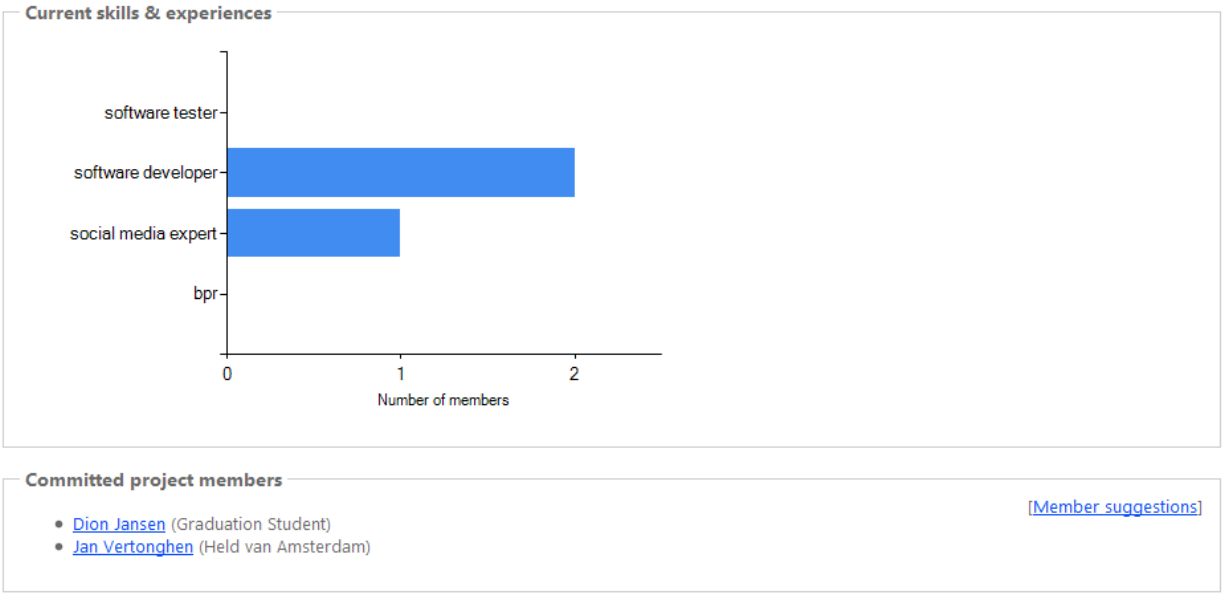



**Figure 19 – The system will show how required skills and experiences for this project to succeed are filled in with the current committed members. In this example the role of "software tester" is not filled yet. Also, apparently none of the current members have affinity with BPR.**

### Commitment to improvement opportunities

From two sides will be tried to bring the right people together, one is from the project management side as explained above. But earlier we also discussed the recommendation of interesting projects to users themselves. In the latter, when there previously was no connection between the project and the contributions the project is based on and a user, a user has the possibility to self-commit to interesting projects. The *self-selection* of stakeholders is one of the traits that are described by the effectuation theory [***25***] and our BPR methodology.

We have developed the use of commitments to go both ways. A user can be invited to commit to a project, and eventually joins that particular project or declines the invitation. A user can also self-commit to the projects he or she is interested in. The individuals responsible for creating the project are able to decide whether this person will be allowed to join or not.

It is important that there is control over who joins a project. First of all, it is desirable that the project remains small, so that minimal investments are needed for the experiments. Second, stakeholders committing to the project should be useful; it does make sense when individuals are members of a project just because it would increase their social status within the organization.

### To summarize

The design and implementation of the proposed improvement(s) is not supported by this collaboration platform. We can imagine that when an organization uses a type of BPM suite, projects can be connected to a collaborative development platform. However, implementing business processes is a complex task, which might not be understood by all project members. In most cases certification of organization depends on documenting their processes well. Linking projects to the actual design phase of the BPM lifecycle would mean that serious effort should be put in the design of the improvement on beforehand. This would means that project members would need training in process design, which is not a fair assumption. Furthermore, this stands in the way of the relative simple experiments we strive for within effectual BPR approach.

To conclude, we presented the design for the effectual BPR methodology in section 4.1.1 and described it in more detail in section 4.1.2. Finally, in section 4.2, we have discussed the effectual collaboration platform that was developed alongside the methodology, which supports an organization in applying the effectual BPR methodology.

In the next section we will describe the evaluation of both methodology and technology and we will present and discuss the results.

# 5 Evaluation

To determine if the effectual BPR methodology is seen as a valuable addition by prospective users and to assess if the collaboration platform has added value, an experiment was carried out. The evaluation took three weeks for which two processes were selected internally at Perceptive Software Apeldoorn: the development process and the customer life cycle process. For each selected process a ballpark was created in the platform.

First we will discuss the instruments used for this evaluation in section 5.1. Then, in section 5.2, the development process will be introduced and results will be presented. Also, platform activity during the evaluation period will be described. Finally, we will interpret these results and draw conclusions. In section 5.3, we will discuss the customer life cycle process.

The experiment within the development process was run as planned. Unfortunately, the experiment with the customer life cycle process was unsuccessful. This means that, for the customer life cycle process, we present only the results of the first questionnaire. We will, however, interpret these results and discuss the observations made during the evaluation period to explain why the evaluation might have failed.

We will end this section with some concluding remarks in section 5.4.

## *5.1 Instruments*

Participants received a presentation explaining the BPR methodology as described in this thesis, and instructions in how to use the platform. Also, special attention was paid to explain how a deliberation map works. We assumed that understanding this part of the system is of great importance for user acceptance.

Based on this presentation participants were asked to fill in a questionnaire to measure methodology and technology acceptance before actually using either. After an evaluation period of three weeks, participants were asked to fill in the same questionnaire again. This allowed us to measure the difference in acceptance before and after usage. We used the Method Evaluation Model (MEM) and the Technology Acceptance Model 2 (TAM2) explained in section 2.8.

**Method Evaluation Model**

For the MEM we slightly adjusted the questions so they referred to our effectual collaboration platform. The questions can be found can be found in the Appendix, section 8.1, Table 5.

**Technology Acceptance Model 2 (TAM2)**

In section 2.8, we discussed TAM2 which contained seven additional constructs to measure user acceptance of technology in greater detail compared to the original TAM. For the thesis, it was decided that only two of the additional constructs will be used, since the other constructs are not, or less, applicable for the evaluation.

Voluntariness, subjective norm, image and output quality were considered beyond the scope of this research. Experience could not be measured because the experiment itself only took three weeks.

Result demonstrability and job relevance are assumed to provide early insight in how well individuals perceive the collaboration platform useful to their job and how well they can explain its expected results. In section 2.8, Figure 10 shows the unused constructs greyed out. The questions that are used in the questionnaire for measuring technology acceptance can be found in the Appendix, section 8.1, Table 6.

**Questionnaire**

The questionnaire consisted out of 32 statements which could be answered on a scale of 1 to 7; 1 meaning the person filling in the questionnaire totally disagrees with the statement and 7 meaning the person totally agrees with the statement. To summarize, the questionnaire evaluates the following topics:

- Methodology
    - Intention to use
    - Perceived ease of use
    - Perceived usefulness
- Technology
    - Intention to use
    - Perceived ease of use
    - Perceived usefulness
    - Job relevance
    - Result demonstrability

In the next section we will discuss the development process.

## *5.2 The development process*

### 5.2.1 Sample

The research and development (R&D) department of Perceptive Software Apeldoorn consists of almost 30 employees. Since February 2012, the department started using Scrum as their software development method and with this a new development process was introduced. The development process is actually a sub-process of the much bigger release management process. The development process was chosen as part of this evaluation for two reasons. The first reason was that this process was the first process that was documented within this department. The second reason was that within the evaluation period of three weeks this process was planned to be fully executed multiple times, which means that suggested improvements could address any part of the process.

The development process described a two-week cycle in which several teams worked on the development of a part of a software product. At the start of each week, a day was scheduled in which teams determined what will be implemented during that week (*Design Day*). During the rest of the week, each day, a meeting was held to discuss past and future work and possible obstacles during the development (s*tand-up meeting*). At the end of each second week, presentations were held by each development team to present what work had been delivered after two weeks work (*Showcase*) and meetings were scheduled to discuss the process itself (*Retrospectives*). After two weeks, the process was repeated. For management of this process at least five different systems were used.

To start the evaluation of the acceptance of the methodology and technology a kick-off presentation was held. For this kick-off presentation 27 people were invited to join, of which 21 people attended. For individuals that could not make it to this meeting, a presentation was recorded in which both

methodology and technology were explained. After the kick-off meeting all 27 individuals received an e-mail with an invitation to join the collaboration platform and to fill in the first of two questionnaires.

### 5.2.2 Questionnaire results

Table 2 shows the results of the questionnaires before and after the evaluation period within the development process. The Cronbach's alphas of the original studies on the used models [***38***] [***40***] are also mentioned to compare them with our results.

**The first questionnaire**

In the Appendix, section 8.2, Table 10 shows the averages per question for the first questionnaire. Measuring methodology acceptance, the Cronbach's alpha of the intention to use is low (0.20). This means that internal consistency if the answers given to the questions making up for this construct is low. The construct consists of two questions, of which one is negated. We think this might have been the cause of the low consistency. The problem might also be that the Cronbach's alpha in the original studies on MEM was based on a sample of 41 participants, whereas we had only 13 participants at our disposal. For perceived ease of use and perceived usefulness of the methodology the Cronbach's alphas are considered acceptable (0.76 and 0.86, respectively).

The Cronbach's alphas found for technology acceptance all indicate that the internal consistency is acceptable, except for the job relevance construct. Good to note is that both job relevance, as well as technology intention to use both only contain two items to measure these constructs and are thus as fragile as the methodology intention to use construct. Pallant [***54***] predicted low Cronbach's alphas for constructs with fewer than ten items.

3 out of 13 participants (23%) indicated at the end of the questionnaire, without explicitly asking for it, it was quite difficult to answer the questions on the introduced technology before actually using it.

| | Model Cronbach's Alpha from [*38*] and [*40*] | First questionnaire | | Second questionnaire | |
|---|---|---|---|---|---|
| **METHODOLOGY ACCEPTANCE** | | **Cronbach's Alpha** | **Average** | **Cronbach's Alpha** | **Average** |
| **Intention to use (ITU)** | 0.83 | 0.20 | 4.73 | 0.77 | 4.61 |
| **Perceived ease of use (PEOU)** | 0.88 | 0.76 | 4.62 | 0.80 | 4.67 |
| **Perceived usefulness (PU)** | 0.85 | 0.86 | 4.55 | 0.92 | 4.61 |
| **TECHNOLOGY ACCEPTANCE** | | | | | |
| **Intention to use (ITU)** | 0.82 – 0.97 | 0.93 | 4.73 | 0.96 | 4.17 |
| **Perceived ease of use (PEOU)** | 0.86 – 0.98 | 0.86 | 4.33 | 0.96 | 4.17 |
| **Perceived usefulness (PU)** | 0.87 – 0.98 | 0.78 | 4.35 | 0.85 | 4.03 |
| **Result demonstrability (RD)** | 0.80 – 0.97 | 0.82 | 4.58 | 0.74 | 4.53 |
| **Job relevance (JR)** | 0.80 – 0.95 | 0.62 | 4.77 | 0.91 | 4.78 |

**Table 2 – The results of the questionnaires measuring acceptance of methodology and technology in the development process. Averages of individual questions are of course inverted where needed.**

**The second questionnaire**

Also shown in Table 2 are the results of the second questionnaire. In the Appendix, section 8.2, Table 10 shows the averages per question. The Cronbach's alpha of each construct is acceptable (>0.70) and therefore no actions have to be taken in order to improve the reliability of the results.

Next, we will describe the activity on the platform from participants within the development process.

### 5.2.3 Platform activity

During the evaluation period, a total of 20 different users logged in to the system. Of these 20 users, 8 people actually contributed (40%) to the discussion on the development process by adding a post to the deliberation map.

Figure 20 shows the distribution of the users who contributed to the collaboration platform. Three users added 10 or more posts, making up for a total of 36 posts of 49 total (~73%). The four users that contributed the most were amongst the people responding to the second questionnaire. These four users were responsible for 41 of the 49 contributions (~84%) in total. This makes their opinion on the technology valuable for this evaluation.

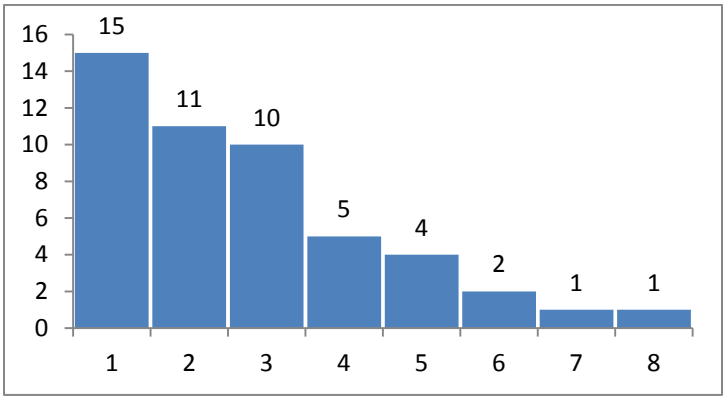



**Figure 20 – This diagram shows the number of contributions for each of the eight people which contributed to the discussion on the development process. Three participants added ten or more contributions.**

In the Appendix, section 8.3, Figure 24 shows the activity on the platform before and during the evaluation period. The number of logins decreased every week. The first week of the evaluation period the average number of logins was six per day (including weekends). The second week an average of little over three users logged in to the platform. Finally, in the third week on average two users logged in to the system per day.

In the Appendix, section 8.3, Figure 25 shows the number of contributions per day shortly before and during the evaluation period. Eight posts were added before the kick-off meeting of the development process. In the first week of the experiment 33 contributions were made (on average, including weekends, 4.7 per day). In the following two weeks 5 (average of 0.7 per day) and 3 contributions were made respectively (average of 0.4 per day).

Within the deliberation map users had the possibility to rate contributions of other users. Also, it was possible to add comments to posts to improve the post in question. In total 5 users used the functionality to rate posts. 16 posts were rated, of which two posts were rated by two different users; the other 14 posts were rated by one person. In total four comments were added, all by different users

to four different posts. The resulting deliberation tree can be found in the Appendix, section 8.3, Figure 28.

### 5.2.4 Difference between active and passive participants

In this section we will revisit the results of the first and second questionnaire presented in section 5.2.2, making a distinction between *active* and *passive* participants of the experiment. An active participant is someone who actually contributed to the deliberation map by adding at least one post. A passive participant is one who filled in both questionnaires and visited the platform, but remained passive during the evaluation period.

For differentiating between these groups, only the results will be used of those who filled in both the first and second questionnaire. Reliability of results will not be checked again, overall reliability was already presented in the previous sections. Table 3 shows the average results for each construct per user group per questionnaire.

Of the nine participants who filled in both questionnaires, five have actually contributed to the deliberation map within the ballpark, four did not.

Making a difference between these two user groups, allows us to analyze the results in greater detail. In the next section we interpret the results for the development process.

| METHODOLOGY ACCEPTANCE | Active participants (average) | | Passive participants (average) | |
|---|---|---|---|---|
| | Questionnaire 1 | Questionnaire 2 | Questionnaire 1 | Questionnaire 2 |
| **Intention to use (ITU)** | 4.40 | 4.70 | 5.00 | 4.50 |
| **Perceived ease of use** | 4.37 | 4.90 | 4.54 | 4.38 |
| **Perceived usefulness** | 4.65 | 4.88 | 4.78 | 4.28 |
| **TECHNOLOGY ACCEPTANCE** | | | | |
| **Intention to use (ITU)** | 4.60 | 4.60 | 5.13 | 3.63 |
| **Perceived ease of use** | 4.25 | 4.10 | 4.56 | 4.25 |
| **Perceived usefulness** | 4.30 | 3.85 | 4.69 | 4.25 |
| **Result demonstrability** | 4.55 | 4.65 | 5.06 | 4.38 |
| **Job relevance (JR)** | 5.20 | 5.10 | 5.00 | 4.38 |

**Table 3 – This table shows the results of both questionnaires, differentiating between active and passive participants of the experiment. For these numbers, results from participants who did not fill in both questionnaires were omitted. Five participants added at least one contribution to the collaboration platform, four remained passive.**

### 5.2.5 Discussion

We cannot stress enough that the number of participants for this experiment was low. Therefore, observations made within this section should be read keeping this in mind.

After the evaluation, we have met with seven participants in informal conversations to discuss our findings. We have asked, for example, why they thought activity dropped so rapidly after the first week,

how they experienced the use of a collaboration platform and if they see the use in participating in improving their own business process.

The ballpark that was created for the development process went from very active the first week to almost inactive the second and third week of the experiment. However, several observations can be made from the activity on the platform and the questionnaires.

Figure 21 shows the results from both questionnaires next to each other. With respect to the acceptance of the methodology, questionnaire results indicate that not much has changed during the evaluation period on average. Perceived ease of use and perceived usefulness of the methodology have increased slightly, the intention to use the methodology has decreased. Other observations are that the intention to use of the collaboration platform has dropped most of all constructs, together with a slight decrease in perceived ease of use and perceive usefulness of the technology.

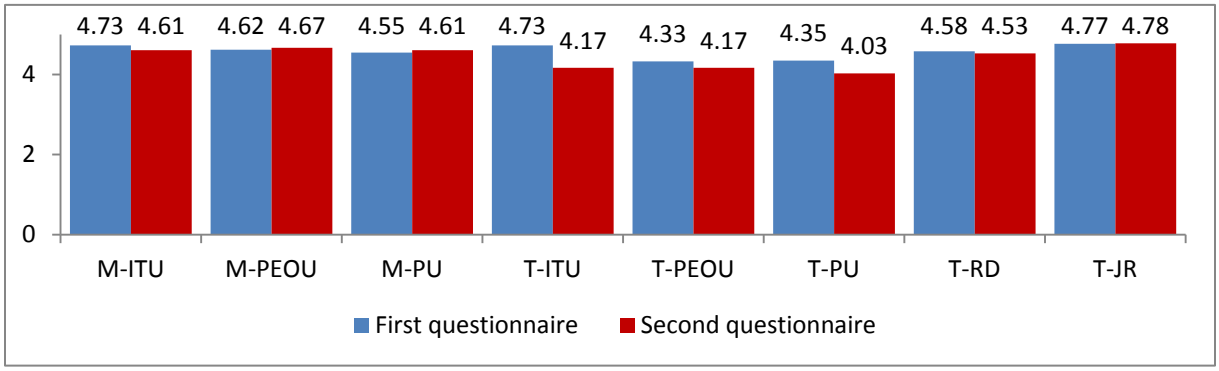



**Figure 21 – This diagram shows the difference in results of both questionnaires within the development process. The first questionnaire had 13 respondents; the second questionnaire had 9 respondents.**

If we take a closer look at the results of the questionnaire, viz. differentiate between results from active and passive participants of the experiment some interesting observations can be made. In the Appendix, section 8.4, Figure 26 and Figure 27 contain visualizations of the results presented in section 5.2.4.

Results indicate an increased methodology acceptance for active participants on all constructs. Intention to use, perceived usefulness and perceived ease of use all increased during the evaluation period. In contrast, those participants who only observed the ongoing discussion, rather than contributed, showed a decrease in overall methodology acceptance. From this observation can be deduced that:

*Being part of the actual improvement of a business process has positive effect on overall acceptance of the methodology.*

On average, there was almost no change in how participants perceived the system relevant for their job. However, active participants found the use of the collaboration platform much more relevant than non-active participants. Still, both valued job relevance of the platform above average (> 4.0).

Active participants felt they could better explain why the use of the system was beneficial after the 3-week evaluation compared to passive participants. Before the experiment it was made clear that probably no projects would come from the discussions. This can make it difficult for participants in general to envision what the actual end-result would be. This can also explain why the perceived usefulness of the system has decreased for both active and passive participants.

Perceived ease of use and perceived usefulness of the technology have decreased after the evaluation period. The system used for this evaluation was actually the first version deemed worthy enough to use in public. Several participants indicated that the navigation within the platform could be improved

significantly. In the Deliberatorium [***20***] frames are used to show the deliberation map next to information on specific posts. In our deliberation map, pop-up showed detailed post information on top of the deliberation map. The difference is shown in Figure 22. It was assumed that this design choice would not have any harmful effect on the user experience, but apparently it has. In a future version of this system, fixing this would be high priority.

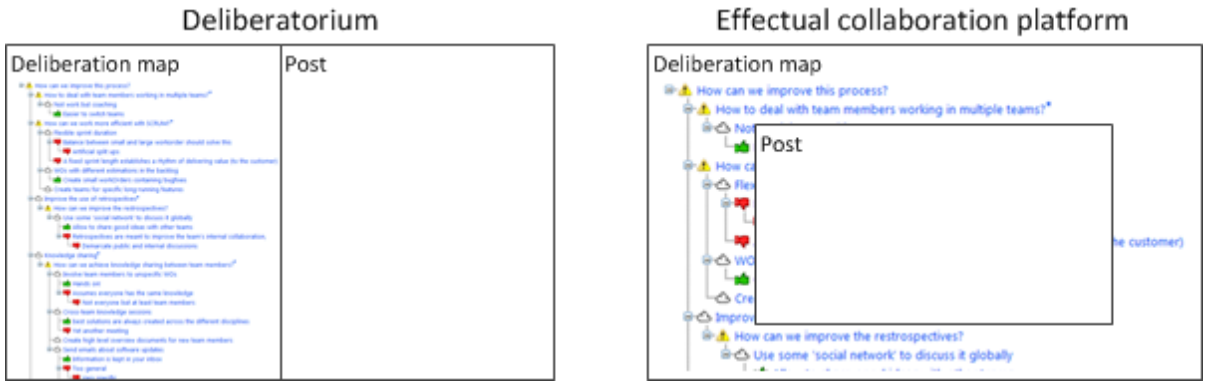



**Figure 22 – On the left, the navigation as implemented in the Deliberatorium; showing a deliberation map in a frame on the left and the selected post the frame on the right. On the right, how posts are displayed in the collaboration platform; when a post is selected a pop-up appears over the deliberation map with the selected post.**

Furthermore, participants felt that the system was disconnected from their everyday activities. The collaboration platform was not used in parts in the development process in which the process itself was discussed. In section 5.2.1, we explained that several meetings were scheduled in the business process where the process itself was topic of discussion. Improvement suggestions made in these meetings were not translated to the online platform; suggestions on the platform were not discussed in these meetings. One participant stopped participating online because it required too much of an effort. It was clear he preferred face to face meetings to discuss these matters.

The use of a combination of an online discussion and scheduled meetings can be very beneficial, for both methodology as well as technology acceptance. Individuals, who do not want to contribute online, can contribute during face to face meetings and vice versa. This way a broader public is invited to contribute to the improvement of the organization's business processes.

Within the collaboration platform, users were only notified of interesting updates with internal messages. To read these messages, users needed to login to the collaboration platform itself. This was a deliberate design choice, to avoid spamming the participants in the early stages of the experiment by e-mail, for example. The use of a news feed might help bringing these updates closer to the users. Supporting future users in pulling content, for example from an RSS feed, allows user to stay up to date in the discussion in software they use for e-mail, scheduling or process management.

During the evaluation, two participants explicitly indicated that there was nothing more to add to the ongoing discussion. The problem was that only a few users actively visited the platform, and even fewer actually contributed. The discussion was only really active during the first week, where users actively responded to each other's contributions. In the second week, another user started to add some contributions allowing the existing active users to respond again. It seems that:

*The cold start problem should not be underestimated for both methodology and technology.*

While the deliberation map can be considered as a broad tree (relatively many children per node) it is not very deep (path from root to a leaf is relatively short). Users which added contributions received feedback from other users on a global level. Discussing an idea or issue in more detail did not occur. This

can be for two reasons: the users did not know this was expected to happen or the improvement suggestions were already of great quality and did not require any elaboration. Since arguments against several ideas exist within the deliberation map (Appendix, section 8.5, Figure 28) we expected counter proposals form others. We acknowledge that during the evaluation an effectual manager was absent; therefore, no individual was responsible for motivating or challenging participants. The absence of an effectual manager during the evaluation period deviates from the desired organizational culture we described in section 3.4. From this, we can deduce that:

*Participants should be encouraged to question the contributions of others.*

An issue created for a particular idea does not necessarily have to ask for alternative solution. Rather, further refinement of the original idea can be strived for. If the environment allows this depends on the organization culture. One individual indicated he did not feel confident enough to actually participate in the discussion without stepping on some toes.

Looking at the statistics, the user acceptance of the methodology is above average. Even better, already during only the discussion on the business process, employees' methodology acceptance increased. We assume this will only improve further when actual projects would have come from the discussion.

The technology to support this methodology needs some additional work to provide users with a better user experience. Being somewhat less user-friendly at the moment, did not affect the intention to use from active participants in the experiment. We assume that improving the user-friendliness of the platform can have beneficial effects on the perceived ease of use, and eventually thus also on the intention to use.

Perceived usefulness of the technology decreased for both the active as passive participants. During the evaluation period of three weeks, the BPR methodology could not be executed in full. As a consequence, not all features of the collaboration platform were used. We theorize that executing the effectual BPR methodology completely and actually providing results will have a beneficial effect on the perceived usefulness of the methodology. Also, the perceived usefulness of the technology is assumed to improve, because then the supportive functionality of the platform might become more apparent to participants. Therefore:

*A longer evaluation period in which actual improvements will be tested in the real world should provide better insight in the acceptance of methodology and technology.*

The next section is used to describe the customer life cycle process, present the obtained results and discuss our observations.

## *5.3 The customer life cycle process*

As mentioned in the introduction of the evaluation, the experiment within the customer life cycle process was not executed as planned. However, we do have results of the first questionnaire which will be discussed in this section.

### 5.3.1 Sample

The customer life cycle process of Perceptive Software Apeldoorn actually consists of several relatively large sub-processes; activities within these processes are executed by multiple departments in the Netherlands, Hungary and the United States. The fact that these stakeholders are spread across the globe means that using an online tool a necessity.

The main contact for this process was the Finance Manager, leading of the Finance department of Perceptive Software Apeldoorn. During a personal meeting it was clear that this manager was already working in a very effectual way, close to the method as described in this thesis. He was in the middle of creating an environment in which the employees obtained experience with the ins and outs of the financial processes they are part of. This knowledge helped them actively participate in the discussion on their business processes. Also, these experiences allowed them to critically look at how the current process was executed. The Finance Manager acknowledged that the working environment and organization culture had a great influence on whether this way of working was successful or would fail. He said it is all about bringing the right people together, because only when you do that, change is possible. Both the leadership style as the existing environment fits the desired culture we described earlier, meaning the effectual BPR methodology could fit nicely.

The customer life cycle process described the path from obtaining a sale opportunity to finalizing a project and receiving payment. Without going in too much detail, from one of six sources a sales possibility could emerge. These so called *leads*, would receive a follow-up from the sales department. When a sale was actually made, professional services would take-over and start a project. A project is then executed in several phases (each again with its own sub-process). These phases are the '*scope and plan'* phase, the '*analysis and design'* phase, the '*implementation'* phase and finally the '*deploy and support'* phase. After a project had finished, the matter of payment was handled. Either the customer had paid and the process ended, or the customer did not pay and an accounts payable was created.

A kick-off meeting was set up to introduce the first four stakeholders of this process. These individuals were all active in Apeldoorn; three working within the department Finance and a Quality Assurance Manager which was responsible for documenting and monitoring existing processes at this location. The planning was to eventually invite several employees from Hungary to the discussion on the process as well.

Directly after this kick-off meeting time was reserved to document the existing process. During this meeting it became apparent that a lot could be improved about this process in terms of efficiency, redundancy and quality. Furthermore, it was noticeable that the Finance employees were unsatisfied with how the current process was executed.

### 5.3.2 Questionnaire results

The evaluation of the customer life cycle process consisted at the start of the evaluation only out of four participants, which is very low. Therefore, we will discuss the results this section with caution. Table 4 shows the results of the acceptance of the effectual methodology. Both the intention to use and perceived ease of use of the methodology have acceptable Cronbach's alphas (>0.70).

In the Appendix, section 8.2, Table 10 shows the averages per question for the first questionnaire. Perceived usefulness of the methodology initially had a Cronbach's alpha of 0.63 meaning that the questions making up for this construct deliver internally inconsistent results. Again, as in the development process, the limited number of participants probably has a great influence on this construct. But in contrast with the issue with the methodology intention to use construct, which only consists of two questions, the perceived usefulness construct contains eight questions. This gives us room to omit certain low correlated questions to increase reliability of this construct.

Closer inspection shows that three questions, namely M-PU1, M-PU3 and M-PU8, are not sufficiently correlated to other questions making up for the construct (Appendix, section 8.2, Table 8). M-PU3 was first omitted from this construct, because it promised the greatest improvement in reliability when removed. The Cronbach's alpha increased from 0.63, to 0.76. The average perceived usefulness of the

methodology increased from 4.938 to 5.00. Table 9 shows the correlations between the remaining questions making up for this construct.

| METHODOLOGY ACCEPTANCE | Cronbach's alpha from [*38*] and [*40*] | Our Cronbach's alpha | Average |
|---|---|---|---|
| **Intention to use (ITU)** | 0.83 | 0.86 | 5.75 |
| **Perceived ease of use (PEOU)** | 0.88 | 0.92 | 4.58 |
| **Perceived usefulness[1] (PU)** | 0.85 | 0.76 | 5.00 |
| **TECHNOLOGY ACCEPTANCE** | | | |
| **Intention to use (ITU)** | 0.82 – 0.97 | 0.84 | 5.88 |
| **Perceived ease of use (PEOU)** | 0.86 – 0.98 | 0.86 | 4.56 |
| **Perceived usefulness (PU)** | 0.87 – 0.98 | 0.85 | 4.81 |
| **Result demonstrability (RD)** | 0.80 – 0.97 | 0.68 | 5.00 |
| **Job relevance (JR)** | 0.80 – 0.95 | 0.73 | 5.63 |

**Table 4 – The results of the questionnaire measuring acceptance of methodology and technology at the start of the evaluation in the customer life cycle process. Averages of individual questions are, of course, inverted where needed.**

For the technology acceptance in the customer life cycle process, the Cronbach's alpha of the result demonstrability of the technology for this process is lower than the desired bound of 0.70. However, considering this construct is made up out of only four questions and that no question had a correlation with respect to other items below 0.3 [***54***], no questions will be omitted to increase reliability of the construct result demonstrability.

Now we have presented the results of the questionnaire, we will discuss and interpret these results in the next section. Here we will also theorize why the BPR initiate did not launch as expected.

### 5.3.3 Discussion

The first meetings with individuals active in the customer life cycle process gave reason to believe the evaluation of methodology and technology in this environment could be very interesting for several reasons.

The person responsible for the Finance Department seemed to already manage the department using effectual traits. Employees were encouraged to familiarize themselves with the processes they were active in. Furthermore, from informal conversations with the different individuals it seemed that within the current process some vital parts could be improved. At first sight, the problems seemed to be related to billing issues, quality of documents within the process and consistency of information in different parts of the process. The impression was that enough discontent existed, which could be used as an encouragement to participate.

[1] One question within this construct was omitted (M-PU3) because of its low correlation with respect to the remaining questions. This increased the Cronbach's alpha from 0.63 to 0.76.

The results of the first questionnaire (Table 4) showed the intention to use and the perceived usefulness of the methodology was relatively high amongst participants, compared to results from the first questionnaire in development process (Figure 23). Also, the averages on job relevance showed that the participants perceived the use of the technology relevant to their jobs. Result demonstrability showed the participants felt that they understood why the collaboration platform was useful. Since parts of the business process were executed in different countries, even different continents, the use of technology was considered as a useful tool at the start of the evaluation period.

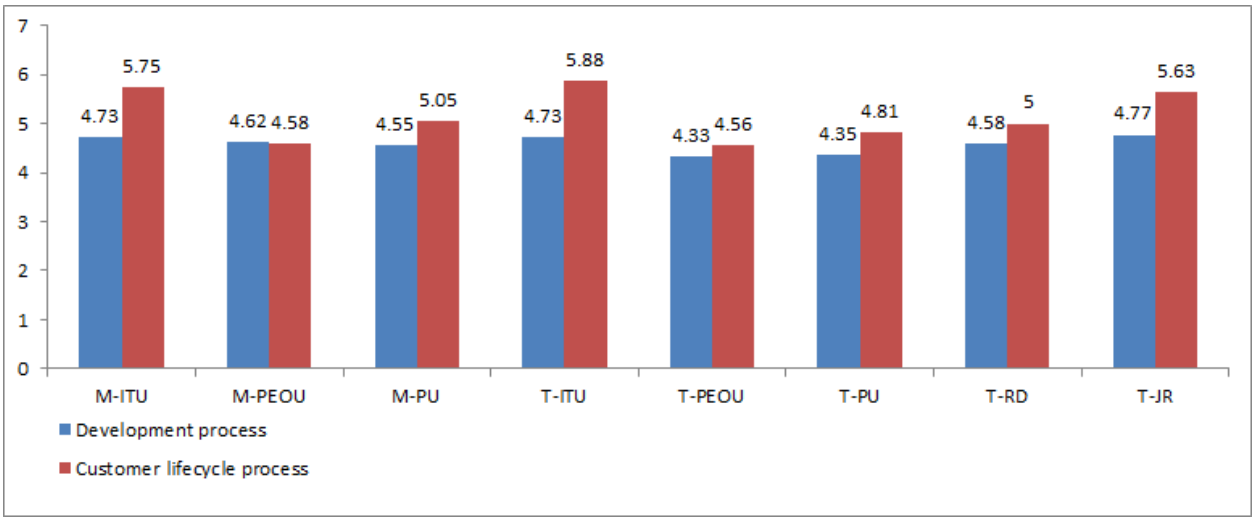



**Figure 23 – An overview of the average ratings per construct of both selected business processes in the first questionnaire.**

At the start of the experiment, first the process itself had to be documented. The modeling of the process first is in line with the strategy that Perceptive Software Apeldoorn embraces. In short, models are created which describe the process in detail. In turn, these models can be exported to a report which shows the model and describes the various actions to be executed within the business process. This first step of creating the model, further defining it and agreeing upon it, already took several days. After putting this report in the ballpark for this process, everything went silent.

Several reasons can be mentioned why the experiment did not take off. First of all, the workload for process performers within the customer life cycle process was already high to begin with. The high workload was a result of changing business processes because of a takeover. On top of that, they had a backlog of work that required their attention. Prioritizing the current work in the existing process over investing time into improving the process is a logical decision. From this can be deduced that:

*For the methodology to take off existing affairs surrounding the process (i.e. the work backlog, environment, and culture) should be in order.*

Employees should be able to have the opportunity to think of improvements next to their existing work. Possibly, for this particular process a more radical BPR approach would have been more suitable.

Another reason why the experiment did not take off can be contributed to the cold start problem. Initially, the only information in the ballpark contained the earlier mentioned process models and some descriptions of the different activities. No initial contributions were put into the deliberation map. Because only four individuals participated at the start of the experiment, face to face meetings might have been more beneficial. Afterwards, these meetings could be translated and documented to the deliberation map within the ballpark. Later, when additional participants would join, this could serve as a basis for further discussion. However, arranging face to face meetings proved to be difficult because of the earlier mentioned high workload.

Introducing the methodology and technology to a broader public might also have helped. Now, the initial four people were expected to start discussing the process. However, not every employee might initially feel the need to participate from the start. Therefore:

*Addressing a bigger public might draw the attention from several people who do not have any problems being the first to start the discussion within the ballpark.*

We suggest the entrepreneurial spirit of these pioneers eventually can trigger others to participate as well.

## *5.4 Concluding remarks*

The experiments conducted with both processes have led to different results. Observations made during the evaluation period were used to interpret these results.

The evaluation for the development process was executed as planned; we obtained data on user acceptance before and after the evaluation period. This allowed us to analyze if using the methodology and collaboration platform had a positive effect on the overall user acceptance. Accumulated results presented in Table 2 and visualized in Figure 21 showed only small differences between user acceptance before and after actually using the methodology or technology. This challenged us to go deeper into the obtained data. We came to the conclusion that there is a noticeable difference in user acceptance of the methodology between active and passive users (presented in Table 3 and visualized in Figure 26 and Figure 27). The acceptance of the methodology of active participants increased during the evaluation period, while passive participants showed a decline in acceptance. However, both groups indicated on above average acceptance of the methodology. The collaboration platform was seen as not user-friendly and the usefulness was questionable, which means further improvements are necessary.

The evaluation of the customer life cycle process did not go as planned. However, the failure of the BPR initiative allows us to observe why this might have happened. The questionnaire results showed a positive attitude towards both methodology and technology. However, mainly because of a high workload the participants were unable to dedicate time to the effort of process improvement. The small number of participating people that initially might also be a cause of BPR initiative not taking off.

Now we have presented and discussed the results of the evaluation we will conclude the thesis in the next section. Furthermore, will list the limitations of the research and propose directions for future research.

# 6 Conclusions

In this section we will conclude this thesis by summarizing the findings of the conducted research. After, we will discuss limitations and future research topics in the section. First, we will state our final conclusions as the result of this research.

## 6.1 *Conclusions*

**How do we develop a flexible BPR methodology which is based on effectual principles?**

We brought a theory from entrepreneurship into the field of business processes and business process redesign. We have developed in BPR methodology which uses the principles of effectuation answering RQ1. The result is a participative BPR approach which uses the process' environment and available means to generate, through stakeholder interaction, business process improvements. The approach advocates flexibility and low risk. The proposed improvements are in turn tested in practice through small experiments which require little to no investments based on affordable resources.

We determined that the successful implementation of this methodology depends on the organization culture and employee participation. Therefore we have described an organization culture in which the methodology would fit best. Management is responsible for employing an organization culture which encourages entrepreneurial thinking and the taking of action in an open environment. An organization should focus on smooth running processes, which requires a specific way of thinking from the employees. This might be a difficult task on itself, but it is important that when improvements are suggested the process should be kept in mind.

**Will an effectual BPR methodology be accepted by prospective users?**

To put the effectual BPR methodology to the test we designed an experiment in which both were brought into practice. Two business processes within Perceptive Software Apeldoorn were selected for process performers to start discussing their process.

In order to answer RQ2, we discussed the results from the evaluation in general and also made a distinction between active and passive participants. Differentiation between active and passive participants showed that actually participating in improving the business process has positive effects on the acceptance of the methodology. Overall, the evaluation showed that the first attempt to design an effectual BPR methodology was well received.

**How do we develop a platform which supports an organization in applying an effectual BPR methodology?**

We have developed a collaboration platform which should support an organization in applying an effectual BPR approach, answering RQ3. This collaboration platform uses ballparks for describing the environment and deliberation mapping to structure the online discussion. The deliberation map we used within the ballparks had two additional features: it hid inactive branches of the tree and dangling deliberations. This would allow participants to focus on the parts that are alive within the ballpark and allow them to discuss ideas or issues outside the existing deliberation map. The system also supports documentation of projects and their results for future reference. Furthermore, the developed system

uses recommendations to bring the right people together, suggesting projects and other users' contributions.

**Will a supporting platform be accepted as a valuable addition by prospective users when applying an effectual BPR methodology?**

The evaluation of the effectual collaboration platform showed that the perceived usefulness was still valued below average. In contrast, the job relevance of the collaboration platform was well above average. To answer RQ4, the intention to use from active participants was above average and did not change during the evaluation. This means we can assume that supporting software will be accepted by prospective users. However, we acknowledge that improving the collaboration platform with respect to user-friendliness is necessary. Additionally, we assume that allowing for actual improvements to be supported by the platform will have a beneficial effect on the acceptance of the technology.

The evaluation was small and did not encompass the setting up of projects or implementation of improvements. This, and some additional topics, is recommended to be part of future research. We will discuss limitations and future research in the next section.

## *6.2 Limitations and future research*

The research presented in this thesis has some limitations which will be presented in this section. Additional research should solve most of these limitations.

- **Limitations of models used for the evaluation**
  The theoretical foundations of both models, MEM and TAM2, used for the evaluation have some limitations [***55***]. In their research, [***56***] questioned the connection between intention to use and actual use. The uncertainty that exists between the intention to use and the eventual adoption can influence an individual's opinion on whether or not to accept the methodology and/or technology. Measuring the intention to act cannot predict the actual act since an individual can eventually decide otherwise. Using another model to measure acceptance and predict adoption of methodology and technology might provide additional insights.
  Furthermore, the used model to measure technology acceptance seems to be more suited for the introduction of information systems. These information systems offer employees support in executing their current activities. The system presented in this thesis supports the effectual BPR methodology, which introduces new activities to the employee. This means that participants need to imagine what the system has to offer them in the new situation, not how they can benefit from it now. In future research, attention should be paid to making this model more applicable to the described collaboration platform.
- **Limitations of conducted evaluation**
  The evaluation conducted for this thesis also has some limitations. First of all, the evaluation is based on a small number of participants. In the development process thirteen individuals responded to the first questionnaire, only nine responded to the second questionnaire. The customer life cycle process only had four participants. This means the statistics presented in this thesis have to be used with caution.
  Second, the methodology was not executed entirely in the evaluation. In turn, not all features in the collaboration platform were used. This means that the measured acceptance is based only on the parts that actually have been visited by the participants of the experiment. This has two consequences. First, the acceptance of methodology and technology is now only measured based on the steps that actually have been executed. Second, the actual end-result of the methodology and technology can only be predicted by the participants, rather than

experienced. The expectations of the participants are for a large part based on the presented expectations of the authors of this thesis and therefor possibly biased.
Finally, during the evaluation period the authors of this thesis were in the same office as the participants of the experiment. It can therefore not be ruled out that we have had an influence on the behavior of the participants in some way.

- **More experiences from practice**
  The presented methodology was a first attempt to bring effectual principles into the field of business process redesign. This first attempt is for the most part based on existing literature from entrepreneurship, business process redesign and organizational culture. Since the methodology prescribes a hands-on approach, we assume that bringing this methodology into practice, additional traits can be observed and adopted. This information can only be obtained from actually applying this effectual BPR approach in practice and using feedback to further fine-tune the methodology.
  The evaluation conducted within this thesis already provided some additional insights in how the methodology can be further improved. For example, future research should determine if a combination of decentralized online discussion and actual face to face meetings is more successful than an online discussion on its own. Also, gathering feedback on the collaboration platform can further improve the user experience.
- **Organizational culture and user participation**
  Although organizational culture and user participation have been discussed in this thesis, the true influence of these two concepts has not been investigated. Research should point out what relation exists between an existing organizational culture and methodology and technology acceptance.
- **Comparison with other BPR approaches**
  In this thesis a BPR methodology was developed based literature on business process redesign and effectuation. The focus was on low costs, flexibility, low risk and employee participation. Within this thesis no comparison was made between the effectual BPR approach and other BPR approaches with respect to these traits or results of projects. Future research should determine if this approach in practice works and differs from other approaches.
- **Coupling with social business process management**
  In the description of the methodology we already discussed that the effectual BPR approach is closely related to social BPM. Several participants of the evaluation acknowledged that the methodology and the collaboration platform were too disconnected from their normal day activities.
  Further research should point out if making the methodology, and technology, actually part of the process and the management thereof will have effect on the acceptance of both.
- **Influence of active participation**
  In the evaluation conducted in this thesis we differentiated between active and passive participants of the experiment. As mentioned, the evaluation conducted was limited, but these initial results indicate the acceptance of the individuals changed differently based on their activity. Searching for additional literature on this or at least research in which similar observations were made had no results. We think that this offers an interesting topic of research. For this thesis, observations give rise to at least two additional questions:
    - While not actively participating in the discussion on their own business process, what did cause the decrease in overall acceptance of methodology and technology?
    - If an employee initially remains passive, will it be harder to eventually encourage this employee to participate?

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# 8 Appendices

## 8.1 Questionnaire

| ID | Statement | Construct Identifier |
|---|---|---|
| 1 | I found the procedure for applying the method complex and difficult to follow | M-PEOU1 |
| 2 | I believe that this method would improve our business processes in a better way than existing methods | M-PU1 |
| 3 | This method might make it difficult for users to understand what is exactly going on | M-PU2 |
| 4 | Overall, I found the method difficult to use | M-PEOU2 |
| 5 | This method would make it easier to use knowledge gained from actually executing the process | M-PU3 |
| 6 | I found the method easy to learn | M-PEOU3 |
| 7 | Overall, I found the method to be useful | M-PU4 |
| 8 | Using this method would make it more difficult to improve our business processes | M-PU5 |
| 9 | I found it difficult to apply the method to our own business processes | M-PEOU4 |
| 10 | I would definitely not use this method to redesign and improve our business processes | M-ITU1 |
| 11 | I found the rules of the method clear and easy to understand | M-PEOU5 |
| 12 | Overall, I think this method does not provide an effective solution to further improve and redesign our business processes | M-PU6 |
| 13 | Using this method would make it easier to communicate possible process improvements to the right people | M-PU7 |
| 14 | I am not confident that I am now competent to apply this method in practice | M-PEOU6 |
| 15 | Overall, I think this method is an improvement to the standard way of redesigning and improving business processes | M-PU8 |
| 16 | I intend to use this method to actively participate in improving and redesigning our own business processes | M-ITU2 |

**Table 5 – The first part of the questionnaire was used to measure the acceptance of the methodology and is based on the MEM [*38*].**

| ID | Statement | Construct Identifier |
|---|---|---|
| 17 | In my job, usage of the system can be relevant. | T-JR2 |
| 18 | Given that I have access to the system, I predict that I would use it. | T-ITU2 |
| 19 | I find the system to be easy to use. | T-PEOU3 |
| 20 | I would have difficulty explaining why using the system may or may not be beneficial. | T-RD4 |
| 21 | Interacting with the system does not require a lot of my mental effort. | T-PEOU2 |
| 22 | Assuming I have access to the system, I intend to use it. | T-ITU1 |
| 23 | I find the system to be useful in my job. | T-PU4 |
| 24 | The results of using the system are apparent to me. | T-RD3 |
| 25 | Using the system in my job increases my productivity. | T-PU2 |
| 26 | Using the system enhances my effectiveness in my job. | T-PU3 |
| 27 | I have no difficulty telling others about the results of using the system. | T-RD1 |
| 28 | I believe I could communicate to others the consequences of using the system. | T-RD2 |
| 29 | In my job, usage of the system can be important. | T-JR1 |
| 30 | My interaction with the system is clear and understandable. | T-PEOU1 |
| 31 | Using the system improves my performance in my job. | T-PU1 |
| 32 | I find it easy to get the system to do what I want it to do. | T-PEOU4 |

**Table 6 – The second part of the questionnaire was used to measure acceptance of the technology and is based on the model shown in Figure 10 and TAM2 [*40*].**

## 8.2 Statistics

| ID | Question | D process | | CL process | |
|---|---|---|---|---|---|
| | | Mean | STD | Mean | STD |
| M-ITU1 | I would definitely not use this method to redesign and improve our business processes | 3.15 | 1.14 | 2.25 | 1.26 |
| M-ITU2 | I intend to use this method to actively participate in improving and redesigning our own business processes | 4.62 | 0.77 | 5.75 | 0.96 |
| M-PEOU1 | I found the procedure for applying the method complex and difficult to follow | 3.54 | 1.13 | 4.75 | 1.89 |
| M-PEOU2 | Overall, I found the method difficult to use | 3.46 | 0.97 | 3.25 | 1.71 |
| M-PEOU3 | I found the method easy to learn | 4.54 | 0.78 | 5.00 | 1.15 |
| M-PEOU4 | I found it difficult to apply the method to our own business processes | 3.77 | 1.01 | 3.00 | 1.15 |
| M-PEOU5 | I found the rules of the method clear and easy to understand | 5.00 | 1.00 | 5.50 | 0.58 |
| M-PEOU6 | I am not confident that I am now competent to apply this method in practice | 3.08 | 0.86 | 4.00 | 1.63 |
| M-PU1 | I believe that this method would improve our business processes in a better way than existing methods | 4.38 | 0.65 | 4.50 | 1.29 |
| M-PU2 | This method might make it difficult for users to understand what is exactly going on | 3.31 | 1.11 | 3.50 | 1.29 |
| M-PU3 | This method would make it easier to use knowledge gained from actually executing the process | 4.85 | 0.80 | 4.50 | 1.73 |
| M-PU4 | Overall, I found the method to be useful | 4.31 | 0.75 | 5.00 | 0.82 |
| M-PU5 | Using this method would make it more difficult to improve our business processes | 3.23 | 1.42 | 3.00 | 0.82 |
| M-PU6 | Overall, I think this method does not provide an effective solution to further improve and redesign our business processes | 3.62 | 1.12 | 3.00 | 0.82 |
| M-PU7 | Using this method would make it easier to communicate possible process improvements to the right people | 4.77 | 0.93 | 5.75 | 0.50 |
| M-PU8 | Overall, I think this method is an improvement to the standard way of redesigning and improving business processes | 4.23 | 0.60 | 5.25 | 0.50 |
| T-IOU1 | Assuming I have access to the system, I intend to use it. | 4.85 | 1.21 | 6.00 | 0.82 |
| T-IOU2 | Given that I have access to the system, I predict that I would use it. | 4.62 | 1.19 | 5.75 | 0.50 |
| T-JR1 | In my job, usage of the system can be important. | 4.62 | 1.04 | 5.50 | 0.58 |
| T-JR2 | In my job, usage of the system can be relevant. | 4.92 | 1.32 | 5.75 | 0.50 |
| T-PEOU1 | My interaction with the system is clear and understandable. | 4.46 | 0.78 | 4.75 | 0.96 |
| T-PEOU2 | Interacting with the system does not require a lot of my mental effort. | 4.23 | 0.60 | 4.50 | 1.29 |
| T-PEOU3 | I find the system to be easy to use. | 4.38 | 0.65 | 4.50 | 1.00 |
| T-PEOU4 | I find it easy to get the system to do what I want it to do. | 4.23 | 0.73 | 4.50 | 1.00 |
| T-PU1 | Using the system improves my performance in my job. | 4.08 | 0.76 | 4.75 | 0.96 |
| T-PU2 | Using the system in my job increases my productivity. | 4.38 | 1.04 | 4.50 | 1.00 |
| T-PU3 | Using the system enhances my effectiveness in my job. | 4.54 | 0.78 | 4.75 | 0.96 |
| T-PU4 | I find the system to be useful in my job. | 4.38 | 1.04 | 5.25 | 0.96 |
| T-RD1 | I have no difficulty telling others about the results of using the system. | 4.69 | 1.49 | 4.50 | 1.00 |
| T-RD2 | I believe I could communicate to others the consequences of using the system. | 4.77 | 1.36 | 5.25 | 1.50 |
| T-RD3 | The results of using the system are apparent to me. | 4.38 | 0.96 | 4.00 | 0.00 |
| T-RD4 | I would have difficulty explaining why using the system may or may not be beneficial. | 3.54 | 1.13 | 2.75 | 1.50 |

**Table 7 – The results from the first questionnaire per individual question for both processes.**

| | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|
| **M-PU1** | .580 | - | .507 |
| **M-PU2** | .000 | - | .702 |
| **M-PU3** | .000 | - | .758 |
| **M-PU4** | .883 | - | .470 |
| **M-PU5** | .194 | - | .627 |
| **M-PU6** | .632 | - | .531 |
| **M-PU7** | .786 | - | .550 |
| **M-PU8** | .608 | - | .575 |

**Table 8 – This table contains the initial data for PU of the methodology in the customer lifecycle process. Overall Cronbach's alpha is 0.63. M-PU2, M-PU3 and M-PU6 have item-total correlation values below 0.3 which means low correlation exists between these items and the other items [*54*]. We decided to omit the results of M-PU3, since omitting this question would increase the reliability the most.**

| | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|
| **M-PU1** | .140 | - | .834 |
| **M-PU2** | .378 | - | .771 |
| **M-PU4** | .849 | - | .653 |
| **M-PU5** | .574 | - | .711 |
| **M-PU6** | .707 | - | .683 |
| **M-PU7** | .974 | - | .681 |
| **M-PU8** | .388 | - | .751 |

**Table 9 – This table contains the data for PU of the methodology in the customer lifecycle process omitting M-PU3. Overall Cronbach's alpha is 0.758.**

| ID | Question | Mean | STD |
|---|---|---|---|
| **M-ITU1** | I would definitely not use this method to redesign and improve our business processes | 3.00 | 1.12 |
| **M-ITU2** | I intend to use this method to actively participate in improving and redesigning our own business processes | 4.22 | 1.39 |
| **M-PEOU1** | I found the procedure for applying the method complex and difficult to follow | 3.33 | 1.32 |
| **M-PEOU2** | Overall, I found the method difficult to use | 3.33 | 1.73 |
| **M-PEOU3** | I found the method easy to learn | 5.22 | 1.30 |
| **M-PEOU4** | I found it difficult to apply the method to our own business processes | 3.11 | 1.17 |
| **M-PEOU5** | I found the rules of the method clear and easy to understand | 4.56 | 1.59 |
| **M-PEOU6** | I am not confident that I am now competent to apply this method in practice | 4.00 | 1.00 |
| **M-PU1** | I believe that this method would improve our business processes in a better way than existing methods | 4.56 | 1.24 |
| **M-PU2** | This method might make it difficult for users to understand what is exactly going on | 3.67 | 1.73 |
| **M-PU3** | This method would make it easier to use knowledge gained from actually executing the process | 4.56 | 1.33 |
| **M-PU4** | Overall, I found the method to be useful | 4.67 | 1.32 |
| **M-PU5** | Using this method would make it more difficult to improve our business processes | 2.78 | 1.30 |
| **M-PU6** | Overall, I think this method does not provide an effective solution to further improve and redesign our business processes | 3.33 | 1.12 |
| **M-PU7** | Using this method would make it easier to communicate possible process improvements to the right people | 4.44 | 1.24 |
| **M-PU8** | Overall, I think this method is an improvement to the standard way of redesigning and improving business processes | 4.44 | 1.67 |
| **T-IOU1** | Assuming I have access to the system, I intend to use it. | 4.56 | 1.74 |
| **T-IOU2** | Given that I have access to the system, I predict that I would use it. | 3.78 | 1.64 |
| **T-JR1** | In my job, usage of the system can be important. | 4.56 | 1.24 |
| **T-JR2** | In my job, usage of the system can be relevant. | 5.00 | 1.22 |
| **T-PEOU1** | My interaction with the system is clear and understandable. | 4.22 | 1.39 |
| **T-PEOU2** | Interacting with the system does not require a lot of my mental effort. | 4.11 | 1.62 |
| **T-PEOU3** | I find the system to be easy to use. | 4.11 | 1.62 |
| **T-PEOU4** | I find it easy to get the system to do what I want it to do. | 4.22 | 1.86 |
| **T-PU1** | Using the system improves my performance in my job. | 4.00 | 0.71 |
| **T-PU2** | Using the system in my job increases my productivity. | 3.89 | 1.17 |
| **T-PU3** | Using the system enhances my effectiveness in my job. | 3.67 | 1.22 |
| **T-PU4** | I find the system to be useful in my job. | 4.56 | 1.01 |
| **T-RD1** | I have no difficulty telling others about the results of using the system. | 4.56 | 1.42 |
| **T-RD2** | I believe I could communicate to others the consequences of using the system. | 4.33 | 0.87 |
| **T-RD3** | The results of using the system are apparent to me. | 4.56 | 1.01 |
| **T-RD4** | I would have difficulty explaining why using the system may or may not be beneficial. | 3.33 | 1.50 |

**Table 10 – The results from the second questionnaire per individual question for the development process.**

## 8.3 Platform activity in the development process

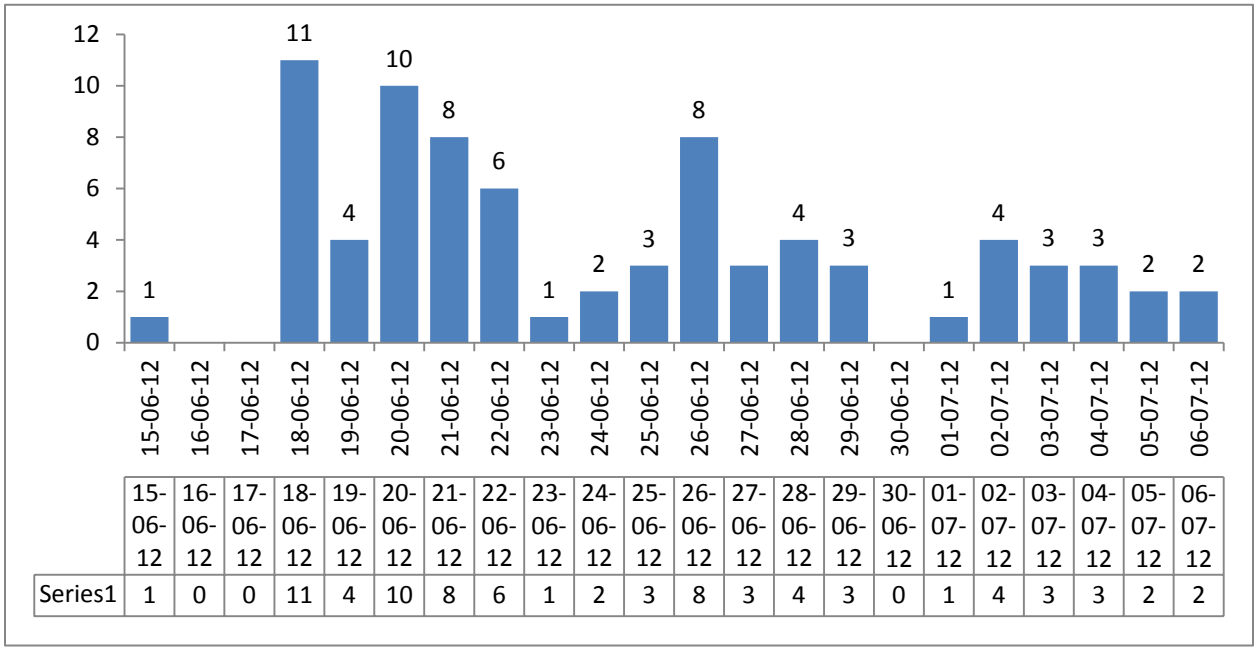


**Figure 24 – This figure shows the number of users that logged in to the system per day. During weekends the activity was low. On weekdays the collaboration platform was visited less every week.**

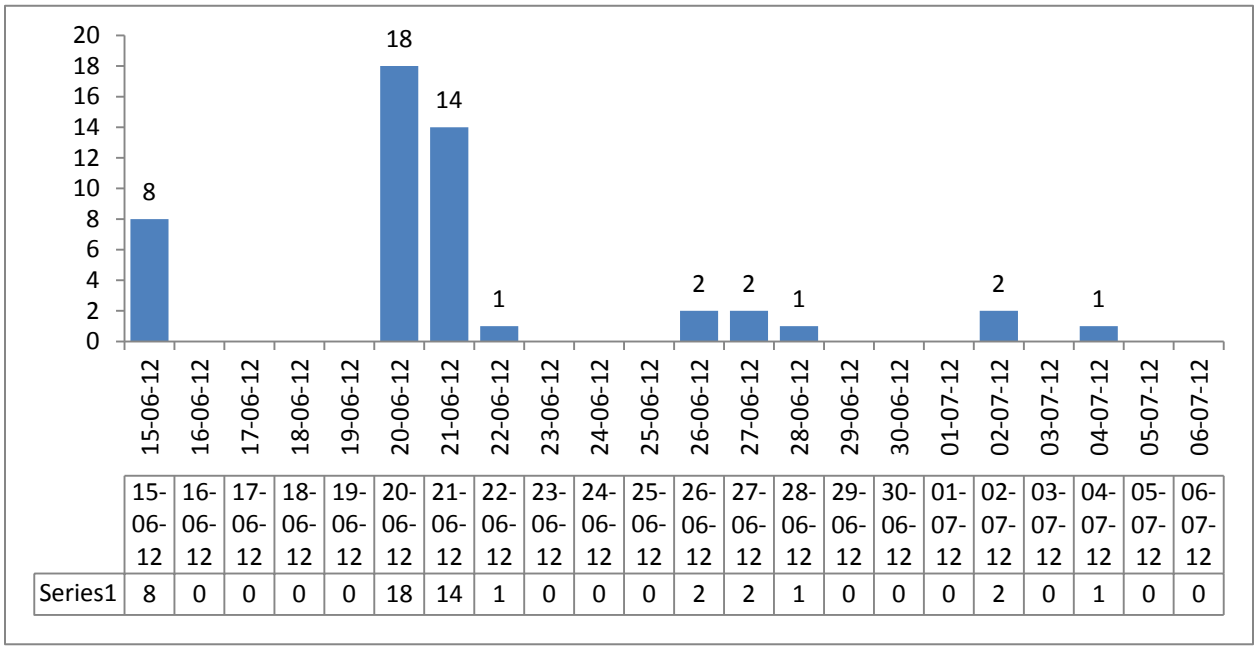


**Figure 25 – This figure shows the number of contributions per day during the evaluation period. It is clear that the collaboration platform was less in demand after the first week.**

## 8.4 Visualization of difference between active and passive participants

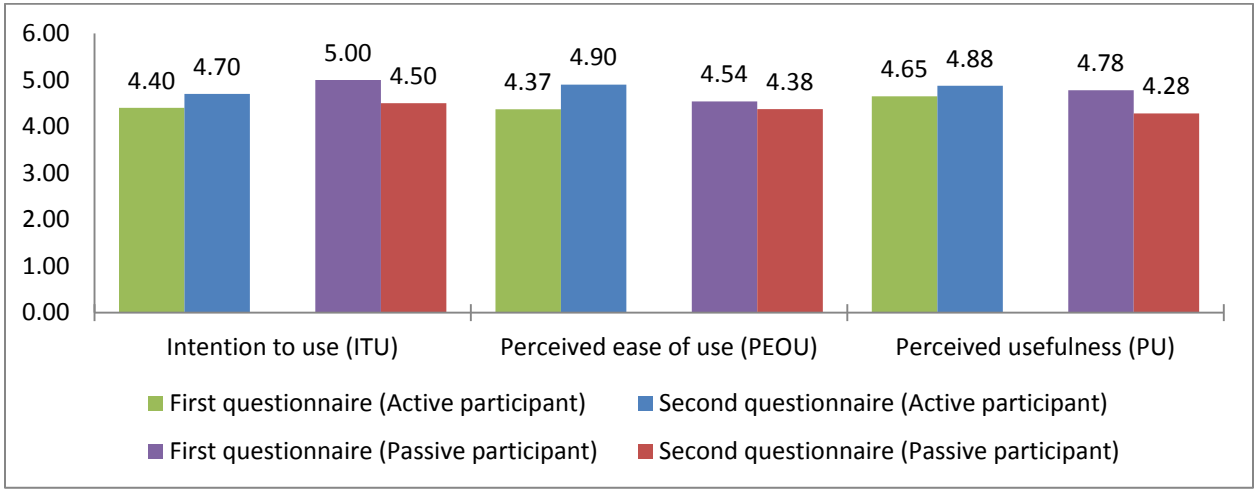


**Figure 26 – This graph shows the differences between the first and second questionnaire with respect to the methodology between active and passive participants.**

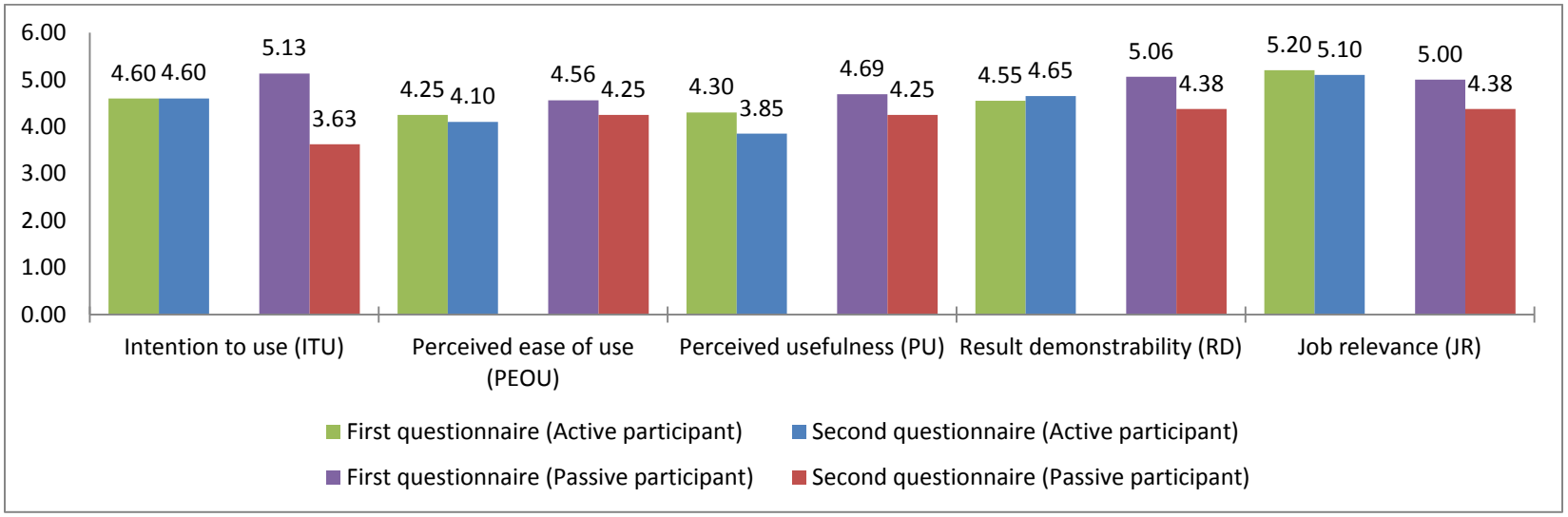


**Figure 27 – This graph shows the differences between the first and second questionnaire with respect to the technology between active and passive participants.**

## 8.5 Final deliberation map in the development process

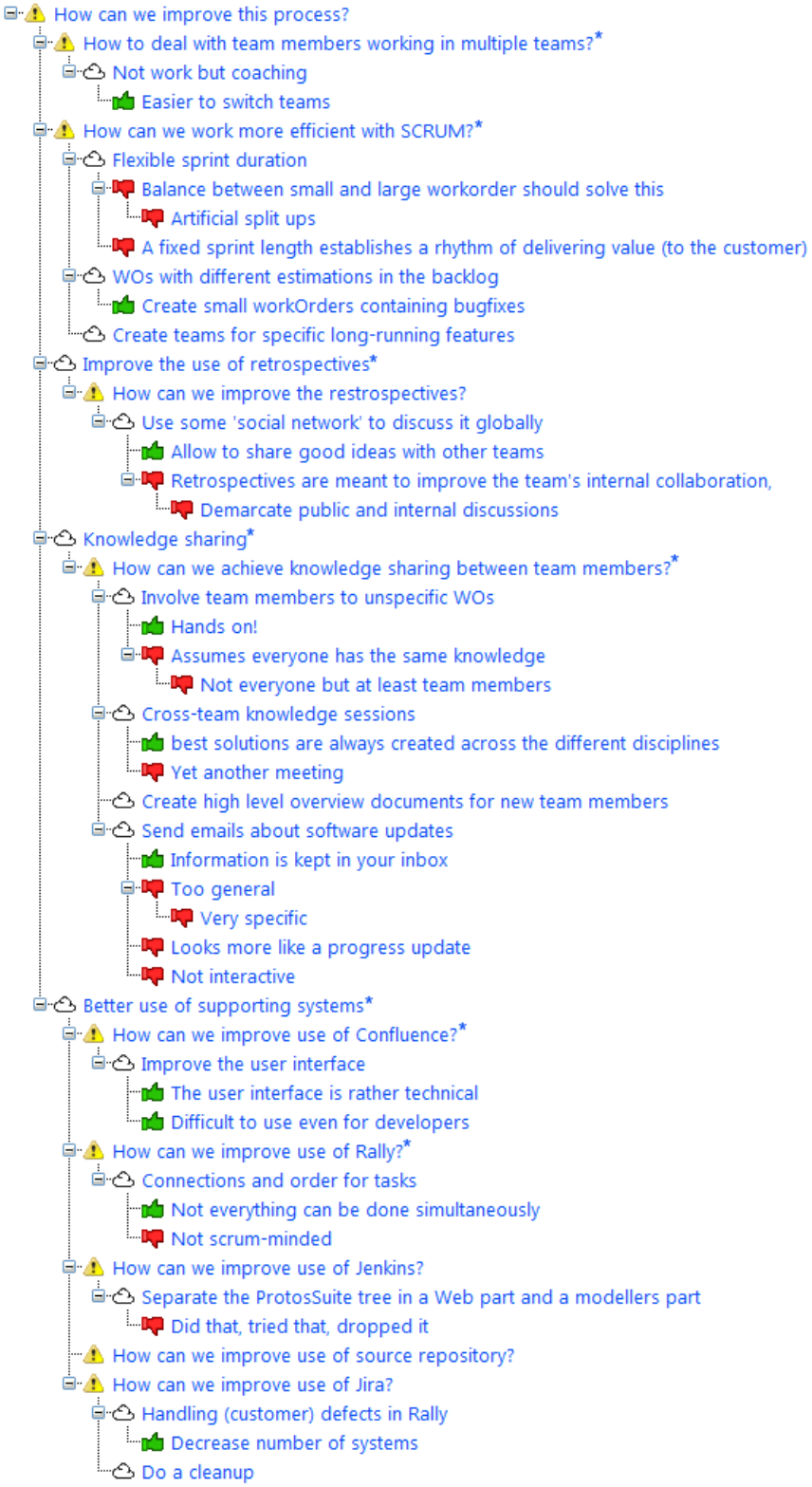


**Figure 28 – The resulting deliberation tree after the 3-week evaluation period. At the start of the evaluation period the deliberation map consisted out of the root node and eight contributions (marked with an asterisk (*)) to overcome the cold start problem.**