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DEVELOPING A METHOD FOR PRIORITIZING BUSINESS PROCESS IMPROVEMENT INITIATIVES

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Abstract

For continuous improvement and innovation in business processes, prioritizing processes is one of the top strategic decision-making tasks for chief information officers and business executives. However, most of the methods for prioritizing process improvement initiatives pay little attention to analysing the characteristics of processes. In addition, in the design process of these methods, the users (e.g. managers, process stakeholders) rarely participate. More importantly, how these methods can be adapted to managers' decision-making process has not yet been fully explored. This paper addresses the need for a new method supporting managers' decision making in prioritizing process improvement initiatives. We describe the design and evaluation of a prioritization and categorization method (PCM). The PCM consists of two models, the process assessment heat map (PAHM) and the process categorization map (CM), as well as five iterative activities. The evaluation results from Ericsson show that the PCM can produce a good-quality analysis of processes. It facilitates the decision-making process by eliciting the "collective intelligence" from key process stakeholders and managers. The findings also reveal the implications of improving the PCM to make it more configurable and dynamic. The paper contributes to business process management and proposes a novel method for prioritizing process improvement initiatives.

Keywords: Process improvement, Process prioritization, Process categorization, Decision making, Design science research

1 INTRODUCTION

For continuous improvement and innovation in business processes, a main strategic decision-making task is to prioritize the processes that contribute the most to the strategic goals (Harrington 1991; Davenport 1993; Dumas et al. 2013). However, due to limited resources, the constraints of organizational capabilities as well as politics in prioritization decisions, chief information officers (CIOs) and top/senior managers face tremendous challenges in prioritizing process improvement initiatives.

The existing scientific approaches to prioritizing process improvement initiatives focus on the generation of revenue, regulatory or social responsibilities or process strategy alignment (e.g. Bandara et al. 2010; Burlton 2010; Hammer 2007). They mainly provide generic descriptive information on the process performance or conditions; they rarely prescribe *how* to improve the prioritization process (Burlton 2010). In addition, the users (e.g. managers, process stakeholders) of these methods rarely participate in the design process. More importantly, how these methods can be adapted to managers' decision-making process has not yet been fully explored. This paper addresses the need for a novel method supporting managers' decision making in prioritizing process improvement initiatives.

We embark on a design science research programme that develops and evaluates the new method, which we refer to as the prioritization and categorization method (PCM). The PCM consists of two models, the process assessment heat map (PAHM) and the process categorization map (CM), as well as five iterative activities. We follow Peffers et al. (2007) design science research methodology (DSRM) in guiding the research. We collaborate with a group of CIOs and senior managers, who are the users of this method, in the design process. The advantages of the research approach are: (1) practitioners can receive reliable and applicable results due to the validity and quality of the method, which is aligned with theories and designed with the "collective intelligence" of a group of CIOs, senior managers and academic researchers; (2) researchers can gain more tactical knowledge and learn about experiences and practices in prioritizing process improvement initiatives and in business process management (BPM) from practitioners, thus greatly improving the applicability of the method to managers' decision-making process. The results from the evaluation at Ericsson show that the PCM is useful, applicable and easy to use. It facilitates "design thinking" in the decision-making process as well as enabling decisions to be made by eliciting the "collective intelligence" from the key process stakeholders. The evaluation also reveals the implications for improving the PCM to make it more configurable and dynamic in future research.

The paper is organized as follows. In section 2, we discuss the relevant literature, which is theoretically aligned with the development of the PCM. In section 3, we discuss the DSRM and our research settings and process. In section 4, we describe the PCM by presenting its components, steps and outcomes. Next, we illustrate the evaluation of the PCM at Ericsson in section 5. Section 6 concludes the paper with a discussion of the lessons learned and future research.

2 BACKGROUND

We build up the knowledge base for the method development by searching and analysing the extant literature on business process management (BPM) and BPM maturity models (e.g. Rosemann & de Bruin 2005; Weber et al. 2004) in general, prioritizing process improvement in particular. The keywords "process improvement AND prioritization", "process selection/identification" and "process redesign", are searched in Scopus, EBSCO, SpringerLink, as well as in Google Scholar. Because strategic alignment is one of the most important criteria for selecting and identifying processes either for improvement or innovation (e.g. Davenport 1993), and information technology plays an important role in BPM; the literature in business IT alignment (BITA) is also included in the search (e.g. Henderson & Venkatraman 1993; Hu & Huang 2006; Luftman 2000). We summarize the key and relevant findings.

- BPM, BPM core elements & BPM life cycle

Dumas et al. (2013, p. 5) define a business process as “a collection of inter-related events, activities and decision points that involve a number of actors and objects, and that collectively lead to an outcome that is of value to at least one customer”. Business Process Management (BPM) has rapidly evolved as a management philosophy and discipline with a specific focus on business processes (Kokkonen & Bandara 2010). It considers the continuous improvement and the fundamental innovation of business processes to ensure that strategic goals and objectives of the organization can be achieved (Burlton 2010). It “combines knowledge from information technology and knowledge from management sciences and applies this to operational business processes” (van de Aalst 2013, p. 1). BPM is also understood as a managerial philosophy for creating a process view of management in order to maintain corporate competitive advantage (Hammer 2010).

Rosemann & vom Brocke (2010) define the six core elements of BPM: strategic alignment, governance, method, information technology, people and culture. They claim that the six elements and the corresponding capability areas contribute to our understanding of BPM as a holistic management discipline. The six elements “make the holistic view on BPM more tangible” (idem, p.120). This framework “has the potential to become an essential tool for such strategy and road-mapping exercises as it facilitates the task of *allocating priorities and timeframes* to the progression of the various BPM elements” (idem, p.119). The authors emphasize the understanding of processes and BPM capabilities in tandem with process lifecycle, i.e. process design & modelling, process implementation and execution, process control and measurement, and process improvement and innovation, as well process project management and program management. We need to adapt suitable method and information technology at the different stages of the lifecycle.

Dumas et al. (2013) further articulate the BPM lifecycle and use it as the starting point to introduce the fundamental knowledge in the BPM area. The BPM lifecycle includes process identification, process discovery (process modelling), process redesign (process improvement), process implementation, and process monitoring and controlling. When new issues are identified in the monitoring and controlling phase, the cycle may require to be repeated on a continuous basis.

Business process improvement is conceptualized as one of the important phases in process lifecycle and BPM lifecycle.

- Business process improvement: process selection criteria & process characteristics

Hammer (2010) points out “even a good process can be made better” and “every good process eventually becomes a bad process” (idem, p. 12). These principles explicitly imply that organizations need to make consistent efforts for process improvement in order to maintain the alignment of the processes with the business strategy, goal and value, which ultimately generate competitive advantage (e.g. Harrington 1991; Davenport 1993; Trkman 2010; Dumas et al., 2013). Harrington (1991) presents the five stages of business process improvement, i.e. organizing for improvement, understanding the process, streamlining, measurements and control, and continuous improvement. Here, we discuss the first two stages as they are the main foci of our research.

The objective of organizing for improvement is to “ensure success by building leadership, understanding, and commitment” (Harrington 1991, p.21). One of the key activities is to select the critical processes for improvement. The literature has defined several process selection criteria (Table 1).

References	Process Selection Criteria
Harrington 1991	Effectiveness: quality & impact on customer. Efficiency (productivity): resources are minimized and waste is eliminated. Adaptability (flexibility): handle future, changing customer expectations and today’s individual, special customer requests.
Davenport 1993	Strategic importance. Process scope. Needs to improve. Difficulty of improvement.
Hammer & Champy 1993	Competition outperforming. Many conflicts/high frequency/excessive non-structured communication. Continuous incremental improvement.

Lee & Dale 1998	The most fundamental and most interactive processes, which are connected with many departments and business functions.
Choi & Lee 2005	Business impact: the relative importance of the business process for the growth of the company. Implementation feasibility: the process is easy and has little risk in implementation. BPM adequateness: the suitability for the BPM implementation.
Dumas et al. 2013	Importance: assess the strategic relevance of each process. Dysfunction: render a high-level judgment of the “health” of each process. Feasibility: assess how susceptible the people are to process management initiatives, either incidental or on a continuous basis.

Table 1. Process selection criteria

The objective of “understanding the process” is to “understand all the dimensions of the current business process” (Harrington 1991, p.22). In this stage, we must clearly understand the characteristics of business processes. Since the more we understand business processes, the more we can improve them. Harrington (1991) presents five dimensions of understanding process characteristics: Flow (the methods for transforming input into output); Effectiveness (how well customer expectations are met); Efficiency (how well resources are used to produce an output); Cycle time (the time taken for the transformation from input to final output); and Cost (the expense of the entire process). It is the quality-based improvement approach (Davenport 1993).

Dumas et al. (2013) argue that analysing business process is both an art and a science. Both qualitative and quantitative methods are applied in process analysis. They present four dimensions to measure process performance quantitatively, which are time, cost, quality and flexibility. The authors also state that these four dimensions are the ultimate goals and measurements for any process improvements (redesign). They further demonstrate the seven elements framework in understanding the most important manifestations of process improvement: i) the internal or external customers of the business process; ii) the business process operation view; iii) the business process behaviour view; iv) the organization and the participants in the business process; v) the information that the business process uses or creates; vi) the technology the business process uses; and vii) the external environment the process is situated in. The framework explicitly discusses the relationship and interactions between “human” and “IT/technology” in the manifestations of process operation, behaviour, as well the process participation and information usage. Harrington (1991, p. 115) says, “The process is brought to life by people”. Additionally, “the degree to which our people embrace the changes made to the process” (idem, p.115), is the key successful factor for any process improvement initiatives. The human side of the process is crucial in BPM (Rosemann & vom Brocke 2010). The organization culture is also an influencing factor in BPM (e.g. Schmiedel et al. 2013). Business process requires also fit of business environment for optimizing values to customers (e.g. Trkman 2010).

Van der Aalst (2013) classifies business processes into person-to-person (P2P), person-to-application (P2A) and application-to-application (A2A) based on the nature of the process participants, either a human or an automated system. He further distinguishes processes into unframed, ad hoc framed, loosely framed and tightly framed processes based on their degree of framing, in other words the degree of correlation with system support. Consider the role of human and technology played in process operation, we can classify processes into two categories: process aware system-driven process and human-driven process. The former can also be understood as a formal process as the operation and behaviour of the process is automated by formal BPM methodologies, and BPM systems (Hammer 2007). The latter can be interpreted as an informal process as human activities are crucial in the process, for example, high-level management work and knowledge work (Davenport 2010; Harrison-Broninski 2010). Such a process is adaptive, collaborative and increasingly supported by social technologies and social BPM systems (e.g. Van der Aalst 2013).

- Business process prioritization methods

The fundamental activity of process improvement is to prioritize improvement initiatives (Burlton 2010). The maturity level of processes and BPM is often considered as an indicator of improvement. However, the models lack applicability and configurability to practitioners (Röglinger et al. 2012).

Previous research has introduced a few methods specifically for the purpose of prioritizing process improvement initiatives, for example, the business value scoring method (Bandara et al. 2010), the process performance scoring method (Huxley 2003) and the value matrix of process and strategy alignment (Burlton 2010). However, these methods only describe the process performance and indicate what to prioritize; the information on how to improve is mostly lacking. Bandara et al. (2010) conclude that the prioritization “remains as a ‘mystery phase’ in most available guidelines” (idem, p. 178).

- Process governance

Process governance is indispensable for the success of business process (Markus and Jacobson 2010). The governance varies significantly with the process scope, objectives and attributes. It is essential to sustain and optimize process improvement performance (Spanyi 2010). Rosemann & vom Brocke (2010, p.113) define the concept as: “BPM governance establishes appropriate and transparent accountability in terms of roles and responsibilities for different levels of BPM (portfolio, program, project, and operations). A further focus is on the design of decision-making and reward processes to guide process-related actions”.

BPM is fundamentally a CIO and senior management responsibility (Zairi, 1997). Harrington (1991) says that “launching a business process improvement effort requires top management’s support” (p.27). It is of great importance that the decision of process prioritization should be transparent, fair and justifiable in order to yield the best results for the company and its stakeholders (Davenport, 1993; Hammer & Champy 1993). It also implies the establishment of organizational capabilities in managing processes, especially in the elements of governance, people and culture (Rosemann & vom Brocke, 2010). It is also essential to create a process vision. Davenport (1993) pinpoints, “The focus is on embodying an organization’s strategy in a vision of the future process state” (p.117). The process vision of a to-be process facilitates the “streamlining” and “implementation” of the process.

Frisk et al. (2013) advocate a design attitude and design thinking in decision making. This approach views “decision making as a creative and adaptive process in which managers recursively collect and interpret heterogeneous evidence, explore and test different ideas, and discover and evaluate alternatives” (idem, p. 2). This implies that managers do not choose or make decisions that are limited by bounded rationality (Simon 1976). Good decisions can be discovered in the decision-making process by involving more relevant stakeholders. The stakeholders around CIOs, such as business managers, have great tactical knowledge regarding the processes in their business; they also have innovative ideas of which processes should be prioritized and how these processes should be improved. If we can collect this intelligence and facilitate decision making, then CIOs’ decision challenge in selecting process and prioritizing process improvement initiatives may be largely reduced.

In the field of BPM, selecting and identifying the core business processes is a crucial issue. Various selection criteria have been proposed (Table 1). Although there is no standardized methodology yet, the literature shows that the selection criteria focus on: i) the strategic importance of the process; ii) the performance of the process; and iii) organizational readiness for process improvement, i.e. culture, people, and governance for implementing a new redesigned or improved process. Previous research shares certain agreements with regards to how process characteristics is analysed and understood (e.g. Harrington 1991; Davenport 1993; Dumas et al. 2013). Quantitative and formal methods are recommended. So the measurements for assessing the process performance in the terms of time, quality, flexibility and cost, are mostly adopted in the research. Notwithstanding the achievements in this research area, we are called upon to develop “creative thinking” and qualitative methods to understand the artistic side of a process that can be complementary to quantitative systematic methods (e.g. Dumas et al. 2013). In addition to ensuring the alignment between business strategy and future process (to be process), we should also pay attention to the resource allocation (e.g. technology, infrastructure, finance, and human resources), as well effective governance of process execution and monitor for sustaining the value creation network. Intentionally, the six core elements of BPM (Rosemann & vom Brocke 2010) should be sufficiently mirrored in understanding a process and creating a process vision.

Prioritizing improvement initiatives is an essential task for process improvement. Managers face enormous challenges to make prioritization decision. Previous research does not propose many methods can be adopted and configured in real business practice. Hence, there is a need for developing a novel and applicable method for CIOs for prioritizing process improvement initiatives. In order to balance the rigor and relevance of the method, it must be: (1) *aligned with the theories*, which means that the design of the method should be aligned with the extent of scientific approaches in BPM; (2) *designed by “collective intelligence in practice”*, which means that we should engage managers’ tactical knowledge and experience in the design and that they, as the end-users of the method, should participate directly in the design search process; (3) *applicable*, which means that the method should be suitable for decision making in a specific organizational context.

3 RESEARCH APPROACH

Orlikowski (2010) asserts the importance of engaging practice in research. She reflects that “focusing on what practitioners do in practice reveals an adaptive and pragmatic intelligibility that is not easily captured in abstract models and formal theoretical propositions” (idem, p. 24). One possible way to engage practice in research is to involve practitioners in the research/design process, as well as allowing them to generate and develop the input, e.g. vocabulary/terminology, in designing a method. Additionally, the managers’ substantive inputs in the design and development phase of the method would influence their actual use of the method (Clark et al. 2007). These activities are also referred to as “engaged scholarship”, which claims the importance of involving practitioners in the research in order to gain collective achievement and “co-product” knowledge “that can both advance the scientific enterprise and enlighten a community of practitioners” (Van de Ven 2007).

This study follows a design science research approach because the preliminary goal is to develop a new artefact (Hevner et al. 2004). By doing so, we build up collaborative practice research activities with a group of CIOs and BPM experts, who are from big companies in the Scandinavian countries (See Table 2). In this paper, the artefact, which we refer to as a prioritization and categorization method (PCM), is designed to support CIOs/senior managers’ decision making in prioritizing process improvement initiatives. Following Peffers et al. (2007), the design science research methodology adapted consists of six activities (Table 2). These activities were implemented through a series of collaborative workshops among CIOs and researchers in 2011–2013. The demonstration and evaluation of the method was executed in business organizations in Sweden. We adopt case study method in evaluating the designed artefact (Yin 2013). We follow the design science publication scheme in reporting the research results (Gregor & Hevner 2013).

The data source for designing the method is both from the theoretical input from research and from managers’ knowledge, experience and reflections gained through a series of collaborative workshops. In order to create a trustworthy environment for the collaboration, we agreed with the managers that no video or audio recordings would be made. The workshop agenda, memos and learning notes are used for documenting the design process. The data from the demonstration and evaluation are collected and stored in the prototype and the web applications of the PCM. The mode of data analysis is guided by the “hermeneutics” framework proposed by Cole & Avison (2007). Through the hermeneutics process from understanding via explanation to interpretation, both the managers and the researchers are able to share the meaning and knowledge of prioritizing process improvement initiatives in the design process. The final interpretation of our joint understanding is the PCM.

Activity 1: Problem identification and motivation (January–September 2011)

The first author formed a collaborative research team together with a senior researcher at the university, a senior business consultant and former CIO of a big Swedish company, a chief business architect from the same Swedish company and a vice president of process improvement and IT strategy from a Norwegian company. The team met for four hours each week to discuss the challenges and problems they encountered in management practice, i.e. business IT alignment, business process management and process improvement. The team consistently learned the theories of BITA and BPM and articulated the managers’ practices both in their life world and in the work world. Such interplay was the fundamental driver of all these meetings.

Key contributions to the PCM development:

1. The five perspectives – positioning (shape IT for business value), relating (decide core business and IT capabilities), preparing (prepare for innovation or change), improving (execute and pursue effectiveness) and proving (demonstrate business value) – were constructed to present the team’s understanding of IT management and business IT alignment. This served as the starting point for activity 3 in which we engaged other CIOs in the design process of the PAHM model.

2. Process improvement is a critical area for CIOs’ management practice in achieving process alignment with the strategy, organizational capabilities and IT. The key research question for this research was clarified: *How can we develop a new method for supporting managers’ decision making in prioritizing process improvement initiatives?* (This question was identified by several iterations of the design process, from both activity 3 and activity 4.)

Activity 2: Define the objectives for a solution (January–September 2011)

This activity was conflated with the first activity. By identifying the problem, we also articulated the objectives for the PCM. (The objectives were refined by the iterations from activity 3 and 4.)

Activity 3: Design and development (October 2011–February 2012)

The research team organized a total of five workshops, a one-day (eight hours) workshop each month, with the CIOs and senior IT/process managers from big Scandinavian companies, e.g. Atlas Copco, Postnord, Vattenfall, Västerås Stad, Bombardier Nordic, SSAB, Scania, Siemens Industrial Machinery, SECO Tools, Statkraft and Sandvik. The research team prepared materials before the workshop. A post-workshop also followed each workshop, during which the team members discussed and reflected on what they had learned. The results were then shared and further discussed with the CIOs in the next workshop.

In the first two workshops, in October and November 2011, the team shared the five perspectives to understand BITA and BPM with the CIOs and senior managers. They adapted the five perspectives in generating the process assessment heat map (PAHM). Theoretical consciousness, mainly from Rosemann & vom Brocke’s six elements of BPM and Hammer’s PEMM, was discussed and further adapted in the PAHM (sample questions).

In the workshop in December 2011, the discussion on the “tagging” of processes started. The process categorization map became the main agenda item in workshops 3 to 5. The CIOs identified several dimensions (e.g., internal vs. outsourced, collaborative vs. closed, structured vs. unstructured, self-contained vs. diverse, differentiating vs. common, close to customer vs. back, automated vs. manual, open vs. close). The three dimensions differentiating–common, informal–formal and value network governance front–back were finally selected and defined to present the process categorization map (CM); the sample questions for each dimension were also discussed and integrated into the method to generate the CM. The CIOs asserted that the three dimensions are prominent in understanding process characteristics in business organizations.

Activity 4: Demonstration (January 2012–February 2013)

The PCM, a prototype based on Excel, was demonstrated in Seco Tools in January–March 2012. The demonstration results were shared with other CIOs in the new series of CIO workshops starting in February 2012. In total, 10 workshops were organized: 8 hours/day per month. The team also worked together in the pre-workshop to prepare the workshop and in the post-workshop for reflections and summaries. The main agenda was to make the PCM better able to support decision making in process improvement initiatives (iterate back to activity 3). (The paper of the case Seco Tools is accepted and will be presented at CAiSE 2014.)

We developed a web-based application of the PCM for further demonstration after the case of Seco Tools. The five iterative activities were added to the method. Bombardier Transportation Sweden conducted a demonstration of the web application in September 2012.

Activity 5: Evaluation (March 2013–)

The PCM is now being tested and evaluated by a number of Swedish companies and public organizations. The web application can document and store the interviews and analyses both for decision making and for academic research. The method is now required to be configurable and dynamic (Ericsson case). A new design activity is beginning (iterate back to activity 3).

Activity 6: Communication (January 2011–)

The team has consistently communicated the research to the practitioners through the workshops as well as through personal communications with other CIOs at social events in these three years.

Other researchers at the university joined the communication activity in February 2013. The “writing” team aims to communicate the research results to academic readers in formal journal/conference publications.

Table 2. The PCM design research activities

4 PRIORITIZATION AND CATEGORIZATION METHOD – PCM

The PCM consists of two models, the process assessment heat map (PAHM) and the process categorization map (CM), as well five interactive activities. The design rationale of PCM are: i) to embrace BPM life cycle view in designing the PAHM, which means assessment investigates process characteristics at the different stages of the process lifecycle and it is on a continuous manner; ii) to reflect the six core elements of BPM in the assessment, which indicates that the perspectives/dimensions and the associated questions are theoretically inspired and guided by the framework; iii) to formulate and justify the perspectives of the PAHM and the dimensions of CM by eliciting the tactical knowledge and practical experience from CIOs and practitioners; and vi) to name the perspectives and dimensions that are derived from the business terms that are used by managers in their practices. Both the models are recognizable for business people and help them to understand and adapt to prioritizing improvement initiatives.

This method is used for two activities: i) selecting processes for improvement, this is done by top management with the purpose of “organizing for improvement” (Harrington 1991); and ii) prioritizing process improvement initiatives among the selected processes, this is collectively performed by a group of process stakeholders and senior managers with the aim of “understanding the process characteristics” (Harrington 1991). The results of the PCM serve as the foundation for top management decision making. Additionally, the results generate “*coarse-grained*” improvement heuristics for to-be processes.

4.1 Process Assessment Heat Map – PAHM

The heat map helps to analyse processes from five distinct perspectives (see Table 3).

The **positioning** perspective is aimed at assessing the alignment of the process with the business strategy, objectives and values. Strategic positioning and value configuration is the approach (e.g. Porter 1996; Stabell & Fjeldstad 1998) that recommends for analysing process activities and value creation in business. With proper positioning, companies are able to identify the degree to which the process is aligned with the business strategy, objectives and values (Hammer 2010; Versteeg & Bouwman 2006). We argue that positioning processes, with the help of the PAHM, support companies in opening employees’ minds to generate critical thinking about process prioritization and to create a common understanding of business processes and possible improvements. The **relating** perspective is designed for investigating the attitudes, roles, risks and rewards of the stakeholders exposed to the process. The literature has recognized the importance of people and culture-related activities in the context of BPM. A focus on these issues results in longer and stronger process improvements and improved management (Rosemann & vom Brocke 2010). The **preparing** perspective is directed at analysing the availability and quality of the key capabilities necessary for process improvements. The **implementing** perspective is focused on analysing the performance of the process that is subject to analysis. The **proving** perspective concentrates on the degree to which processes are appropriately monitored and measured. Therefore, it is necessary to define the proper metrics and the right KPI levels.

PAHM perspectives	Sample questions
Positioning assesses the alignment of the process with the business strategy, objectives and values.	How clearly has the management positioned the process role, mandate and importance in relation to the business strategy and operational model? Is the process well described in the management system?
Relating assesses the attitudes, roles, risks and rewards of the stakeholders exposed to the process.	Do stakeholders share risks and rewards among the units/departments? Do stakeholders have a clear understanding of the process? Are all the key stakeholders in agreement with the process interfaces and improvement roadmap?

Preparing assesses the availability and quality of key capabilities for improving the process.	Do people have the right skills and competence? Are the necessary resources secured? Do we depend on a key person? Do people commit to the process?
Implementing assesses the performance of the process that is subject to analysis.	What are customers' (internal, external) perceptions about the performance? How well do the interfaces work around supporting processes? How effective is the process?
Proving assesses the degree to which the process is appropriately monitored and measured.	How well is the business impact measured? What is the right level of process evaluation/measuring? What are the relevant KPIs? What is the relevant feedback loop?

Table 3. *The PAHM perspectives and sample questions*

Table 3 shows the working definitions of the five perspectives and the sample questions, which are adapted from previous framework (e.g. Hammer 2007; Rosemann & vom Brocke 2010). The perspectives take a process lifecycle view, from process identification (positioning), process redesign (relating and preparing), process implementation (implementing), to process monitoring (proving). The perspectives also mirror the six core elements in BPM. Positioning mirrors strategic alignment; relating reflects the elements of culture, people and governance; preparing implies the elements of method, IT, people and culture; implementing embodies the elements of governance, method and IT; and proving mirrors the elements of method and governance.

Because each organization has its own strategy and business processes, the model allows managers to define and refine crucial aspects and questions in each perspective relevant to the heat map (PAHM). The motivation for this design choice is twofold. First, the questions used should motivate and engage managers and stakeholders to provide tactical knowledge and sample experiences. Therefore, the questions should be directly related to their work life, experience and context. Second, the information included in the heat map should be focused on each relevant process and on each relevant perspective, so that the prioritization and decision making fit a specific organization. Relevant information to complete the heat map is collected based on interviews with managers and key process stakeholders.

We adopt Hammer (2007)'s colour regimes and quantitative measurement method in the heat map. If a process according to the perspective chosen is considered by CIOs or stakeholders to be eligible for improvement, the colour red is used to indicate the improvement potential to be more than 50%. If it is considered to have an improvement potential between 20% and 50%, the colour amber is used. If the process is considered to have less than 20% improvement potential, the colour is green. The heat map offers opportunities to provide comments and motivations for the assessment based on the current performance and expected improvements. The colours and comments are documented. All the assessments based on interviews are then consolidated in one table (see Figure. 3). The process with the highest number of red assessments will then receive the highest priority.

4.2 Process Categorization Map – CM

The PCM offers the possibility to position processes in a space that is defined by three dimensions, i.e., differentiation, formality and governance in the value network (see Table 4). The result is presented in what is labelled as the categorization map (CM) (Figure 1). The map is intended to obtain indicative information/heuristics on how the prioritized processes resulting from the heat map can be improved, e.g. the type of process support system that should be used, the degree of change in the process that is desired, i.e. incremental improvement or re-engineering, and how to build up a governance mechanism to create and sustain value in the network.

The dimensions for selection are based on three criteria. First, the fundamental criterion for prioritizing a process is the degree to which it contributes to the business strategy. It is important that the process must make it possible for the company to differentiate itself from its competitors by creating added value. Hence, we define **differentiation** as the degree to which a process is superior to analogous processes of competitors and supports the value proposition of the organization. A continuous scale is used with differentiating processes and common processes as the extremes.

Second, BPM systems have become the inseparable mirror of process management. Information technology capabilities have to support process management capabilities (Van de Aalst 2013; Mithas et al. 2011). If a process is fully aligned and supported by information technology, then it can become formalized and contribute to cost-effective execution. As a contrast, if a process is unpredictable and knowledge-intensive, the operational cost in an organization will increase considerably (Swenson, 2010). Hence, an assessment of the degree of formality is crucial for the analysis. **Formality** means the degree to which a process is strictly managed, repeatable, predictable, automatable and involves applications rather than people. Formality is scored on a continuous scale with formal and informal as the extremes.

The third criterion is the phenomenon of companies in the different value networks collaborating to co-create value for consumers and create network value, i.e. revenues for individual network partners (e.g. Franz et al. 2012; Kothandaraman & Wilson 2001; Rai et al. 2012). The positioning of a specific process in a value creation network helps companies to allocate limited resources to support value creation and relation building with network partners (Franz et al. 2012). This leads to serious (re)consideration of establishing a proper governance structure and mechanism for sustaining the network value. Thus, network governance is identified as the third dimension. **Value network governance** thereby, is defined as the degree to which a process interacts with network partners/customers either at the back end or at the front end. Hence, back end and front end are opposites. This dimension produces the heuristics for establishing effective process governance for to-be processes. For instants, if the process ownership was changed from the back end, e.g. the production to the front-end, e.g. the marketing service, then the governance structure and mechanism should be transferred accordingly. The marketing manager may have the key accountability and responsibility of the new process. Organizations must explicitly address the need for cross-functional collaboration and management accountability for the firm's end-to-end business processes in order to ensure the fit between business process and business environment (Markus & Jacobson 2010).

The three CM dimensions propose the most fundamental factors for creating a process vision, i.e. business process strategy (differentiation), BPMS/IT strategy (formality), and BPM governance strategy (value network governance). The operationalization of the dimensions supports firms to embody these strategies into the future vision of a process.

CM dimensions	Sample questions
Differentiation assesses the degree to which a process is superior to analogous processes of competitors, thereby differentiating the value proposition of the organization (scale: differentiating to common).	Does the process in scope differentiate your company from your competitors? Does the process in scope perform worse than your competitors?
Formality assesses the degree to which a process is strictly managed, repeatable, predictable, automatable and involves applications rather than people (scale: formal to informal).	Does the process in scope reside on tactical knowledge? How strict is the process in scope managed? How much of the process in scope is conducted in an unstructured way? How much of the process is carried out with manual work?
Value network governance assesses the degree to which a process interacts with front-end or back end customers in the value network (scale: back to front).	Does the process interact with suppliers, consumers or others actors in the value network? Where is the ownership of the process in scope?

Table 4. The CM dimensions and sample questions

Figure 1 shows an example of how a process can be positioned in the CM space. The map displays a business process: letter A illustrates the current *as-is* position and T indicates the *to-be* position of the same process. The map is constructed as a six-cell grid in two dimensions rather than a cube in three dimensions. The reasons for this design choice are that: 1) the visualization of results in two dimensions is easy to understand and 2) a process that has the characteristics of being common and informal, independent from the question of whether it is a back-end or front-end process, *ideally*



should not exist. However, we realize that such a process may remain in reality and A* is then used to indicate this instance. The CM is engaged in the assessments from level 1 to level 3, which are the core corporate processes (level 1), process areas (level 2) and main processes (level 3) (Davis & Brabänder 2007). The reasons for this design are that we aim to avoid complexity in the assessment and that top management is not interested in the syntactic details of the lower business processes.

Figure 1. CM map

4.3 The PCM: Activities and Outcomes



Figure 2. The PCM activities

The PCM has five iterative activities (Figure 2), as follows:

1. Create a new assessment: companies can initiate an assessment in the method.
2. Select the assessment processes: the task is completed by CIOs or other C-level managers. The selection activity follows the PCM.
3. Select the assessment questions: the top management team defines the key questions (adhering to the five PAHM perspectives and the three CM dimensions) in the assessment. The questions reflect the real problems and challenges of prioritizing processes in the organization.
4. Select the assessment participants: the C-level managers are advised to select the appropriate persons to be involved in the assessment. By doing so, the aim is: (1) to involve more managers at different organizational levels/functions in gathering more opinions, increasing the transparency and trustworthiness of the assessment and creating a social and learning process for prioritizing and managing processes; (2) to ensure the quality of data input for achieving reliable and valid results from the assessment. Next, the interviews are conducted. The interviewees are asked to decide on a colour, green, amber or red, based on their knowledge and experience of the process, by interactively discussing the key questions within each perspective with the researchers/facilitators. They are required to give concrete reasons for choosing a specific colour. They are also asked to give their advice on how to improve the process. All these comments are documented in the PAHM. Second, the interviews focus on process categorization. The interviewees perform the as-is analysis of the process by reflecting on the three dimensions and answering the questions based on the current situation. Subsequently, they consider the same questions again but with a to-be focus, projecting two to three years into the future. They project the as-is dot and the to-be dot on the CM. The interactions during the PAHM help the interviewees to familiarize themselves with the assessment. Their learning and reflections serve as the base for projecting the dots in the CM and generating the final map.
5. Summary: the results from the individual interviews are summarized and visualized in the PAHM (table) and CM (map). The top management team in the organization can then make a decision based on the summary. The PAHM can support the prioritization of the “red” process for improvement. The CM can also serve to identify the gap in process performance by comparing the different projections of as-is dots and to-be dots; the to-be dots of a process provide more indications of how the process can be improved in terms of the three dimensions. The management can also consider aligning the core BPM elements and the associated organizational capabilities in preparing the implementation of the prioritized processes and the possible changes.

5 THE PCM EVALUATION: THE CASE OF ERICSSON

Ericsson, one of the largest telecommunication companies in the world, evaluated the method in a pilot study in September–October 2013. The aims of the pilot were: 1) to find an easy and simple method that gives Ericsson a view of the status of its processes and end-to-end flows, as well as creating a common understanding of the problems and improvement potential; 2) to understand the characteristics of the processes and identify the indications for improvements; and, ultimately, 3) to make the decision on whether to include the PCM as a recommended method for process analysis in the Ericsson Business Process (EBP) framework. The principle aim for research purpose is to determine how well the artefact (PCM) working (Hevner 2004). The evaluation criteria of a designed artefact- utility, quality and efficacy- are adapted in this case study. Semi-structured interviews were conducted by following the case study research guidelines (Yin 2013).

The PCM was used for analysing five processes: sales, finance, sourcing, service delivery and supply. They are all level 2 processes at Ericsson. Eleven people were involved in the interviews, and they also evaluated the PCM. Moreover, we interviewed the top manager and the project manager who were in charge of the pilot. The sales process received the highest number of “red” in the analysis by

Perspective	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11
Positioning	Yellow	Yellow	Green	Green	Yellow	White	Yellow	Red	Green	White	Red
Relating	Yellow	Red	Yellow	Yellow	Yellow	White	Red	Red	Yellow	Yellow	Green
Preparing	Yellow	Red	Red	Green	Red	White	White	Green	Yellow	White	Green
Implementing	Yellow	Yellow	Red	Green	Yellow	Green	Yellow	Red	Yellow	White	Yellow
Proving	Red	Yellow	White	Green	White	White	Red	Red	Yellow	White	White

Figure 3. PAHM-the sales process at Eriksson



Figure 4. CM-the sales process at Eriksson

comparison with the other processes, and therefore needs to be prioritized for improvement (Figure 3: R=interviewee; blank= no answer). The problem and inefficiency of the sales process are shown in all the perspectives of PAHM, especially in the perspectives of relating, preparing and proving. The results indicate that managers should focus more on internal relationship management across various business functions (relating), increasing both human capitals in BPM (preparing) (e.g. Kokkonen & Bandara 2010) and adopting formal methodologies in monitoring and controlling the performance of the to-be process (proving) (e.g. Harrington 1991; Dumas et al. 2013). The CM results (Figure 4) show the as-is state of the sales process located in the space of common, formal and front. It is considered to be underperforming in comparison with the competitors. The to-be state is moved towards differentiating, informal and the middle line of “back and front”, which indicates that the process should be improved for differentiating and more collaboration should take place between the back and the front in the value network, i.e. more collaboration with other process areas, especially with product and service providers. Hence, the governance structure must clearly address the management responsibilities of the to-be process with the aim of fostering the cross functional collaborations.

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The evaluation of the method is positive. A manager stated: “in general a good method for the purpose, good results on fairly limited time spent”. The management team and process stakeholders have gained a shared and common understanding of the five processes in the analysis, helping them to identify the critical processes – in this case, the sales process – that need immediate improvement. The CM results have imposed the direction to improve the process, which is supportive of decision making. The aims of the pilot have been achieved. This pilot also generated feedback for improving the PCM: 1) the functionality of data retrieval should be improved. The comments document in each perspective/dimension should be able to be retrieved at each process level. 2) The activities of the PCM should give more guidelines on how to select and identify the “right” people for interview. A

process analyst commented: “In order to get results on the method, the selection of interviewees is very important. People need to know the processes and various particularities of the processes. Then, it is important to cover the various dimensions of the company in the terms of strategic, tactical and operational. For example, it is necessary “to involve process executors from the operational dimension”. He also pointed out that “people are cautious and reluctant to comment on other processes”. 3) Ericsson also requires the method to be configurable to achieve a better fit with its business terminology and organizational culture. In the end, the top management team was quite satisfied with the method and decided to use it for analysing processes at Ericsson. It is indeed the most significant indicator for demonstrating the utility, quality and applicability of the PCM.

6 DISCUSSION AND CONCLUSION

This paper sets out to analyse a three-year ongoing design science research programme developing a prioritization and categorization method (PCM). The method aims to support CIO and top management decision making in prioritizing process improvement initiatives. We argue that the PCM contributes to process management as a novel method for selecting and prioritizing process improvement initiatives. It clarifies the prior theoretical “mystery” of prioritization by presenting an analysis of processes from the five perspectives of the PAHM and the three dimensions of the CM. This method is qualitative in nature, and based on subjective human judgement and tactical knowledge from managers and process management practitioners. The PCM activities also create a new way of facilitating and making decisions in prioritizing processes, which is to elicit the “collective intelligence” from the key stakeholders. This is in line with the “design thinking” in decision making (Frisk et al. 2013). The PCM is useful and applicable in a real decision-making context, as the evaluation shows. It avoids the complexity and difficulties in configurations of the most established BPM maturity models. The paper contributes to business process management by proposing a novel method for prioritizing process improvement initiatives. The method can practically support CIOs and business executives of large corporations in decision making.

However, the findings from the Ericsson case reveal implications for our future research; in particular, “to improve the configuration capability” is identified as a new objective of the method. First, the PCM activities should provide constructive guidelines to assist companies in identifying the “right” people for interviews. This will ensure the full benefits of using the PCM, i.e. data quality, reliability and validity of the analysed results. People in both the formal network and the informal network in organizations should be identified and included in the assessments (Krackhardt & Hanson 1993). An organization is a complex social system (Gharajedaghi & Ackoff 1984). Second, the PCM should improve its configurative power in order to perform an analysis for a specific process in a specific organization in order to produce high-quality results. We cannot view firms as homogeneous. They have different resources and capabilities in managing processes (Rosemann & vom Brocke 2010). Niehaves et al. (2013) also argue that divergence theory should be used to inform decision makers to build dynamic capabilities in process management instead of using the convergence theory perspective. Although the PCM is developed and derived from the knowledge, experience and reflections of the CIOs and BPM experts in this research, the method still cannot represent the complexity in the real world at the current abstract level. Currently, we are testing and evaluating the PCM at a number of Swedish companies and public organizations, e.g., Vattenfall, Sandvik, Swedish Social Security Agency, Swedish Immigration Board, Sweden Radio, etc. We aim to collect more evidence to improve the PCM by making it more configurable and dynamic. Third and last, we will improve the functionality of the PCM web application to facilitate better data retrieval at the process level. We will also add an evaluation function for collecting more ideas on how to improve the PCM.

To conclude, the PCM is a novel method for selecting processes for improvement and for prioritizing process improvement initiatives. It is applicable in the real business decision-making context. The results are useful for supporting top management decision making. Since the use of a designed artefact on a single project may not generalize to different environment (Markus et al. 2002), we will continue to evaluate and develop the method in future research.

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