Core software product management activities

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Abstract

Purpose – Software product management (SPM) unites disciplines related to product strategy, planning, development, and release. There are many organizational activities addressing technical, social, and market issues when releasing a software product. Owing to the high number of activities involved, SPM remains a complex discipline to adopt. The purpose of this paper is to understand what are the core and supporting SPM activities.
Design/methodology/approach – The authors adopted the research method of meta-ethnography to present a set of techniques for synthesizing individual qualitative studies to increase the degree of conceptualization. The results obtained from three empirical studies were synthesized using the meta-ethnography approach to enhance, rethink, and create a higher level abstraction of the findings.
Findings – The results show that the study has both theoretical and practical contribution. As the meta-ethnography synthesis has not been widely applied in software engineering, the authors illustrate how to use this research method in the practice of software engineering research. The practical contribution of the study is in the identification of five core and six supporting SPM activities.
Originality/value – The practical value of this paper is in the identification of core SPM activities that should be present in any company practicing SPM. The list of supporting SPM consists of activities that are not reported to product manager but affect the product success.

Keywords Software engineering, Product management
Paper type Research paper

1. Introduction

Software product management (SPM) can be considered as a synthesis of many disciplines, such as product and release planning, strategy, and development supporting a product from idea to maintenance (Ebert, 2007; Haines, 2008). Neither the industry nor the academia has a single widely accepted and used definition of SPM. However, what the existing definitions have in common is that SPM unites technical and business perspectives in the development of software products. In addition, SPM considers the product value provided to the customer as a central concept, and therefore, it also overlaps with value-based software engineering (Boehm, 2003; Ojala, 2008). SPM is also an example of a complex socio-technical phenomenon, owing to its cross-functional nature. The social aspects of SPM include interaction between people and departments within an organization and the roles people have. The technical aspects of SPM include activities related to engineering the product and its parts, e.g., development, architecture, and testing (Lehtola and Kauppinen, 2006; Gorschek *et al.*, 2010).

SPM consists of a multitude of activities in the process of software product development. The existing product management (PM) frameworks include up to 40 activities managed or orchestrated by a product manager (Kittlaus and Clough, 2009; Pragmatic Marketing, 2014; Fricker, 2012). The intertwined relationships between PM and other business functions like development, sales, marketing, support, and strategic management make it difficult to start

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the adoption of PM or to introduce changes in the existing processes, because they can easily become disruptive (Dver, 2003). An attempt to make radical rather than incremental changes has been identified as a common problem in the adoption of PM (Maglyas *et al.*, 2012). Some studies also warn about the introduction of disruptive changes (Christensen and Overdorf, 2000; Nikula *et al.*, 2010).

In this paper, we contribute to the SPM body of knowledge by investigating SPM practices in companies with the aim to identify core activities of SPM. Because companies face common problems in the adoption of SPM like long release cycles, short-term thinking, and a lack of constant collaboration between organizations and customers (Maglyas *et al.*, 2012), the improved understanding of SPM practices would help companies to focus on improving the core SPM activities rather than trying to spread the focus to all SPM activities. Meta-ethnography is one of possible ways to combine knowledge (Britten *et al.*, 2002), because it goes beyond narrative summaries and literature reviews and involves some degree of conceptual innovation (Strike and Posner, 1983).

The paper describes the meta-ethnography that is based on the three empirical studies that we have conducted independently using different research approaches. The first study (Maglyas *et al.*, 2012) investigates PM activities in 13 companies in depth, whereas the second study (Maglyas *et al.*, 2012) summarizes existing PM activities in hundreds of companies worldwide. The third study (Maglyas and Fricker, 2014) evaluates PM activities based on the practical experience of PM professionals. The meta-ethnography approach applied to these studies has allowed us to focus on the common SPM activities adopted in the studied companies.

2. Related work

2.1 Origins of SPM

Initially, PM was introduced to meet the challenges of branding a strategic product at Procter & Gamble in 1931 (Gorchels, 2000). This experience was so successful that the practice of hiring managers for products, or product managers, spread outside the company and was adopted by competitors and other industries (Toffel, 2003; Carroll and Grimes, 1995). In the 1960s, the concept of PM started to attract the attention of researchers. In 1965, Borden created a model, known as the 4Ps of marketing, consisting of product related to the issues of product development or creation, place related to the process of identifying or developing the markets where the product can be marketed and sold, price related to the financial considerations, and promotion related to the activities of product advertisement and market communications (Borden, 1965). Although Borden's model is today considered as a marketing framework (Jager, 2007), the model is not limited to marketing only and presents several dimensions related to the product (Broom *et al.*, 1991). Therefore, it can be seen as one of the first theories of PM.

SPM is a discipline that combines technical and business perspectives in the development of software products. Because the goal of any product is to provide additional value to the customer, SPM may be seen from the perspective of value-based software engineering (Boehm, 2003; Ojala, 2008).

Ebert (2007) defines SPM as "the discipline and role, which governs a product (or solution, or service) from its inception to the market or customer delivery to generate biggest possible value to the business." Based on empirical investigation of projects in the telecommunication industry, Ebert found that the focus on SPM can reduce the cycle time in the business unit by 36 percent. In addition, SPM was found to have a positive effect on quality (Ebert, 2007). The goal of SPM, which is summarized as generating value to the business, is embedded in Ebert's definition. In this regard, SPM plays an important role in managing products to achieve the company's business goals and creating a winning strategy in the market.

Steinhardt, an expert in PM for high-tech industries, has a slightly different view of PM. According to his definition, PM "is an occupational domain that is based on general

management techniques that are focused on product planning and product marketing activities" (Steinhardt, 2010). Moreover, he considers PM as a core strategic function in organizations.

According to Haines (2008), "product management is business management at the product, product line, or product portfolio level." He defines PM as a model for a business organization, which includes strategizing, conceiving, developing, introducing, managing, and marketing products.

The foci of the three definitions above are quite different. The first one concentrates on the main goal of PM as a source of value for the business, whereas the second emphasizes two main components of PM (product planning and product marketing). Haines' definition of PM describes PM as equal to business management, but at different levels of the product, product line, and product portfolio. Overall, all these definitions describe PM from various perspectives. A lack of a unique and widely accepted definition of PM is one of the signals suggesting that we are dealing with a complicated phenomenon.

In comparison with other industries that started to adopt PM decades ago, e.g., Toffel (2003), Carroll and Grimes (1995), SPM has a short history. Its birth in the software industry was associated with the technical side of managing software products. Early studies on SPM were presented by Kilpi in 1997 (Kilpi, 1997a, b). In these studies he considers SPM as "a process consisting of version control, configuration management (CM), PM, and total product management" (Kilpi, 1997a). He emphasizes that PM of software products includes all the processes common for managing conventional products, but there are also other processes specific for software products only (Kilpi, 1998). In comparison with previously developed models of PM that mainly concentrated on the marketing and sales activities of PM, Kilpi also took technical activities of PM in the software industry into account, such as the processes of organizing version and CM for delivering software products. Lately, other characteristics of software-intensive products in which the primary component is software have been investigated for their effect on the PM of this type of products (Gorschek *et al.*, 2010).

Software is a specific type of product representing the result of human thinking, or in other words, knowledge rather than physical artifacts (Kittlaus and Clough, 2009). It has also been claimed that software is the most sophisticated product of human invention that we currently know (Messerschmitt and Szyperski, 2003). In comparison with other engineering disciplines, e.g., car manufacturing where testing is usually handled separately by machines (Carroll and Grimes, 1995), software products are often designed, developed, and tested by teams within an organization. These specific characteristics of software have resulted in the development of SPM as a distinct discipline (Ebert, 2007; Dver, 2003; Condon, 2002).

2.2 SPM frameworks

There have been several attempts to develop a PM framework. Some PM frameworks describe the activities irrespective of the business domain, e.g., Pragmatic Marketing (2014), whereas others have been developed based on studies and observations of software products (Kittlaus and Clough, 2009; Ebert, 2009; van de Weerd *et al.*, 2006a, b; ISPMA, 2014). These frameworks have overlapping parts, but they have different structures and use different terminologies to describe similar activities. For example, depending on the framework, the components of SPM may be described as functions (Kittlaus and Clough, 2009), activities (Ebert, 2009), or process areas (van de Weerd *et al.*, 2006a, b).

The Pragmatic Marketing Framework (Pragmatic Marketing, 2014) provides a blueprint of 37 key PM activities grouped into four clusters: strategic, market, technical, and sales activities. The framework represents a general overview of PM activities regardless of the business domain in which it is used.

The Reference Framework for SPM (van de Weerd *et al.*, 2006a, b) represents a synthesis of SPM activities based on studies and observations of mainly large software companies.

The framework defines four main process areas: portfolio management, product roadmapping, requirements management, and release planning, with their inputs and outputs.

Another framework is presented as a list of PM activities supporting the product lifecycle from the strategy and vision development through concept, development, and market entry to its evolution (Ebert, 2009). In total, 18 activities have been identified as related to the management of software products. According to Ebert (2009), the goal of SPM is to provide leadership to activities like portfolio management, strategy definition, product marketing, and product development.

The SPM Framework proposed by Kittlaus and Clough (2009) defines the major functions involved in SPM with tasks to participate in or to orchestrate. In this framework, the SPM activities are divided into corporate- and product (family)-level activities, which are differentiated by the level of authority and strategic effect to the company business. In addition, this is the first framework in which the core PM activities are identified. The first two functions, Market Analysis and Product Analysis, are the sources of qualitative and quantitative data for a product manager, who makes decisions and operates based on this information. The Product Strategy and Product Planning functions unite the core PM activities, such as portfolio management, resource allocation, positioning, and roadmap. These major activities include business-related activities, such as business case and pricing model development, as well as legal aspects of product development. The rest of the functions, Development, Marketing, Sales and Distribution, Support and Services, are functions orchestrated by the product manager.

The SPM Framework has formed the basis for the development of the ISPMA SPM framework (Fricker, 2012; ISPMA, 2014). The ISPMA SPM framework is not only an evolution of Kittlaus and Clough's SPM framework but also a synthesis of the reference SPM framework (van de Weerd *et al.*, 2006a, b) and SPM activities (Ebert, 2007). Therefore, it may be considered as the latest view of the organization and evolution of SPM.

In addition to the described frameworks, researchers and practitioners argue about the inclusion of additional activities related to SPM, such as finance (Konig, 2009), defect management (van de Weerd and Katchow, 2009), and software CM (Kilpi, 1997a). The discussion on which activities are related to PM is still in progress. However, the Annual PM and Marketing Survey (Pragmatic Marketing, 2010), which explores the responsibilities of product managers, reported that in 2010 the most frequent activities of product managers included maintaining the roadmap (91 percent), writing product requirements (86 percent), understanding market problems (77 percent), defining positioning (74 percent), and performing competitive landscape (73 percent). According to the same survey results, product managers are often involved in a few activities only, rather than in all the activities described by the frameworks. Full coverage of all the presented framework activities is achieved through hiring several product managers and assigning them different areas of responsibilities (Pragmatic Marketing, 2010). Therefore, it is valuable to understand which activities are central to the role of the product manager and which activities could be fully delegated to other roles.

3. Meta-ethnography

Meta-ethnography represents a set of techniques for synthesizing qualitative studies. Initially developed by Noblit and Hare (1988) to provide guidelines for a synthesis that goes beyond narrative summaries and involves some degree of conceptual innovation, meta-ethnography allows researchers to increase the degree of conceptualization based on several individual studies (Britten *et al.*, 2002; Noblit and Hare, 1988).

Meta-ethnography allows researchers to bring together different studies employing various research methods and contexts. It can also provide an alternative viewpoint to previously conducted studies, to rethink and enhance the results (Doyle, 2003).

Meta-ethnography as a research method aims at synthesizing qualitative studies, or developing "translations of qualitative studies into one another" (Noblit and Hare, 1988). We have used meta-ethnography, which involves both induction and interpretation (Noblit and Hare, 1988), rather than combining and amalgamating, typical for the integrative synthesis (Dixon-Woods *et al.*, 2005). Meta-ethnography offers several advantages to other methods of synthesizing qualitative and quantitative evidence, including a systematic approach to the synthesis (Dixon-Woods *et al.*, 2005), potential for preserving the interpretive properties of the primary data (Dixon-Woods *et al.*, 2005), extension of borders of individual studies (Doyle, 2003), and a potential to deal with quantitative data (Doyle, 2003).

Meta-ethnography has been successfully applied in social science, medical, and e-government research, e.g. Al-Janabi *et al.* (2008), Siau and Long (2005). A rare example in software engineering (Da Silva *et al.*, 2013) concluded that the use of meta-ethnography is not straightforward. Similar observations that some aspects of the meta-ethnography method are not yet fully established have been done in nursing and medical research (Walsh and Downe, 2005; Atkins *et al.*, 2008). Therefore, we also contribute with an additional worked example and reflections on the epistemological status of the results from the meta-ethnography for its application.

We selected meta-ethnography for this study to unify results from different studies. With meta-ethnography, we aim to achieve a consistent picture of the core activities in SPM. This makes adoption of SPM practices easier for practitioners and clarifies the discourse in SPM in academia. Meta-ethnography is a suitable approach for this task because it allows combining the results of several studies.

The advantages of meta-ethnography include a systematic approach to synthesis and potential for preserving the interpretive properties of the primary data (Dixon-Woods *et al.*, 2005). However, in comparison with the synthesis of quantitative studies, which is well developed, the synthesis of qualitative studies cannot be done mechanically. Therefore, it has the problem of transparency common to all qualitative studies (Campbell *et al.*, 2003). To make the process more transparent, Noblit and Hare (1988) propose a seven-step process for conducting a meta-ethnography study:

(1) identifying the research question;

(2) identifying literature relevant to the research question;

(3) reviewing the selected literature;

(4) determining how the studies are related;

(5) translating the studies into one another;

(6) synthesizing translations; and

(7) expressing the synthesis.

The Noblit and Hare (1988) guidelines assume that the studies for the synthesis are selected based on an extensive search to locate all relevant studies within the selected topic (Finfgeld-Connett, 2010). In this study, we selected our own studies for the synthesis that has been recognized as another approach to conducting the synthesis (Sandelowski *et al.*, 1997). However, it makes the starting steps of the guidelines like identifying literature relevant to the research question obsolete, and therefore, the guidelines require minor changes to better reflect the synthesis process and to address the concerns on sampling strategy and thick descriptions of individual studies. The changes are proposed for the first three steps whereas the other steps remain the same.

The first step proposed by Noblit and Hare (1988) is "identifying research question." The guidelines authors suggest are selecting a research question for the study and then looking for relevant literature. However, when combining own studies, the researchers are already

limited to their studies and therefore familiar with what is relevant for the synthesis. Although we consider the selection of the research question as important for any study, we also think that motivation is important to highlight what theory the meta-ethnography authors are going to develop or contribute in. The synthesis should provide a means for determining the similarity between studies to provide a higher level of abstraction than the selected individual studies (Sandelowski *et al.*, 1997). However, research questions and objectives of interpretive studies are often stated broadly, and therefore, it is difficult to predict accurately by looking at research questions only what findings the studies have produced. The findings can emphasize different perspectives and viewpoints to the studied phenomenon and may be the subject of interest for different meta-ethnography studies. It is common to define the meta-ethnography scope of interest and research questions that are not based on the synthesis of research questions from individual studies but rather based on the interest for conducting a meta-ethnography study (Britten *et al.*, 2002; Sandelowski *et al.*, 1997). Therefore, we revised the first step as "describing the study motivation and identifying the research question."

The guidelines provided by Noblit and Hare (1988) do not provide a clear strategy on how to identify studies relevant to the research question. With increasing availability and functionality of digital libraries, the identification of relevant studies is often done using search queries with the terms of interest in the databases. However, this strategy has several problems like getting a great amount of studies whereas only a few can be included in the meta-ethnography study (Al-Janabi *et al.*, 2008), missing studies that are not indexed by the database (Atkins *et al.*, 2008), or restricting the retrieval of relevant studies with the selected search strategy (Atkins *et al.*, 2008). Conducting a meta-ethnography study based on the synthesis of own studies solves all these problems and allows focusing on providing rich descriptions of studies' context, sources of evidence, and analysis techniques that are important for latter steps of meta-ethnography to illustrate how translating and synthesizing have been done. The focus on the description of individual studies addresses the concerns related to the loss of explanatory context of interpretive studies and provides more information to the reader on how the analysis and interpretation of individual studies have been done.

The second step proposed by Noblit and Hare (1988) is "identifying literature relevant to the research question." When synthesizing own studies, this step seems to be obsolete. Instead, we propose to use it for rich descriptions of the studies' context and sources of evidence that will help to explain the translating and synthesizing procedures in the latter steps. It helps in justifying the concerns about validity and generalizability of the study by building a consistent line of argument defined as "the development of a new model, theory, or understanding by synthesizing and interpreting first and second order constructs found in the text" (Atkins *et al.*, 2008). Therefore, we revised the second step as "describing the context and sources of evidence of individual studies."

The third step of the guidelines is reviewing the selected literature (Noblit and Hare, 1988). We interpret this step as getting familiar with the selected studies and extracting the most significant for the meta-ethnography results. For reporting purpose of this step, we propose to summarize the results of the studies that have selected for the meta-ethnography and briefly presented in the previous step. In this regard, the authors should extract first- and second-order constructs according to the Schütz's (1971) terminology from individual studies to use them in the synthesis. We chose to focus on summarizing and highlighting the key findings with their contextual information relevant for the synthesis. This is a preparation step for the next steps of determining how the studies are related and translating them into one another. Often not all findings are relevant for the synthesis (Finfgeld-Connett, 2010), so this is the time to select and extract relevant findings for further synthesis. Therefore, we revised the third step as "summarizing and highlighting the key findings relevant to the synthesis."

Overall, these changes in the synthesis process are minor and they do not disrupt the process, but we consider them as better highlighting the content and challenges that should be addressed when synthesizing own studies.

4. Meta-ethnography procedure

In this section, we document the seven-step process for conducting meta-ethnography as proposed by Noblit and Hare (1988) with the revisions proposed in the previous section.

4.1 Describing the study motivation and identifying the research question

We have studied the adoption of SPM activities in various settings of small, medium, and large companies and used primarily the grounded theory approach (Strauss and Corbin, 2008) to reveal different perspectives of PM practitioners to the SPM adoption. Knowing and keeping all these perspectives in mind, we decided to aim at understanding "What are the core and supporting software product management activities?" In other words, our aim was to identify what PM activities should be the primary focus of a company adopting SPM incrementally rather than disruptively. The study uses the term core activities similarly to the definition given by Kittlaus and Clough (2009) as "the major functions with which a software product manager is involved." The supporting activities, on the other hand, refer to activities, which are not reported directly to the product manager but affect the product success.

4.2 Describing the context and sources of evidence of individual studies

The research process for individual studies was designed as a method consisting of three data collection rounds and an inductive analysis of the collected data. For study A, the collected interview data were complemented by supporting documentation gathered from interviewees. For study B and study C, two surveys on the core activities of SPM were conducted using qualitative and quantitative data. Study B was a special type of survey where the respondents were not limited by providing any predetermined options for answers usual for surveys, as the problem was approached in an inductive fashion to keep the meanings as open as possible. In study C, we evaluated core and supporting PM activities based on the experiences and responsibilities of practitioners. Then, we synthesized the results obtained from the three studies using the meta-ethnography to enhance and rethink the results. This allowed us to create a higher level abstraction of the results than in individual studies.

The use of multiple sources of evidence including surveys, interviews, and supporting documentation helped to gain deeper understanding of the organizational context and its effects on the adoption of SPM. This also increased the validity of the results and helped to mitigate the potential bias of the interviewee's subjective viewpoint to the internal situation in any particular organization (Yin, 2002).

The units of analysis (Yin, 2002) for all three studies were PM activities and processes that support the product lifecycle. The semi-structured interviews conducted for Study A with managerial and technical personnel at each company helped to elicit details of PM activities in the organizations (Table I). The questions about the product lifecycle and activities supporting the lifecycle were asked from all the interviewees. Additional questions on organizational, hierarchical, and product structure were asked to understand the companies and the interviewed individuals better, but these questions were specific for each interview.

In study A after 14 interviews, we were no longer able to identify new categories. The interviewees talked about the same activities and issues in the PM adoption, but their focus on each topic varied depending on the organization and the role. We considered this as a sign of theoretical saturation (Corbin and Strauss, 1990), but we additionally conducted three more interviews to confirm our hypothesis.

Company	Company size	No. of employees	Business domain, type of product	Interviewee role(s)
A	Extra large	10,001+	Developer of software products for operational support systems	Product manager
B	Large	1,001-5,000	International developer and supplier of a wide range of software products for the marine industry	Deputy managing director for R&D
C	Large	1,001-5,000	Developer of Internet products and services	Two product managers
D	Large	1,001-5,000	Developer of security products for users and enterprises	Product manager
E	Medium-large	501-1,000	Developer of products for storage management	Product manager
F	Medium-large	501-1,000	Developer and provider of telecommunication products and solutions, software and hardware	Department manager
G	Medium	101-500	Developer of products for data security and storage management	Product manager
H	Medium	101-500	Developer and integrator of software products and solutions for small and medium enterprises	Deputy director of software development
I	Medium	101-500	In-house development of software products for internal use	Senior business analyst
J	Medium	101-500	Developer of software products for software developers	Product marketing manager
K	Medium	101-500	Developer and provider of the products for interactive media	Project manager, team lead
L	Medium	101-500	Developer of banking software products	Two product managers
M	Small	11-50	Developer of software products for servers	Sales director, technical director

Table I.
Companies and interviewees' roles studied for software product management-related activities

The interview data were complemented with supporting documents. The interviewees were asked to provide documents written by product managers. We received 11 documents, 484 pages in total (Table II). We checked how the information collected during the interviews was reflected in the supporting documentation. For example, we checked whether the product manager worked in strategy development and how it was reflected in the documentation. In addition, publicly available information about the company was studied to get a general understanding of the business. After the interview, a brief review of the sources, such as annual reports, product announcements, and press releases, was made.

Document title	Company	Type	Size
Product plan	H	Text document	132 pages
Product specification	H	Text document	61 pages
Product vision	H	Text document	35 pages
Product plan	I	Presentation	17 slides
Positioning statement	I	Text document	12 pages
Features and advantages for the Client	I	Text document	7 pages
Release plan	L	Presentation	6 slides
Project status	L	Spreadsheet	13 pages
Release plan	L	Spreadsheet	3 pages
Strategy	L	Text document	196 pages
Application description with technical details	M	Text document	2 pages
	Total		484 pages

Table II.
Supporting documentation obtained from the companies for analysis

Study B and study C also aimed at the identification of core and supporting PM activities from the practitioner's viewpoint. However, instead of in-depth interviews used in Study A to investigate PM activities in detail in companies, our focus for this study was set to cover more companies and SPM practitioners than in Study A. Getting a reasonable number of answers is time consuming. Therefore, we approached the issue of how practitioners understand PM by designing and conducting study B and study C as surveys.

Study B was a special type of survey with only one open-ended question published in a public LinkedIn group for PM professionals, allowing them to answer this question freely but briefly. The question was the following: "A very basic question for my fellow group members. What is Product Management? Please try to limit your response to 3 bullet points or as short as possible." This LinkedIn group has 20,000 members, 47 percent of whom indicated PM as their primary function. Other members were from consulting (5 percent), marketing (5 percent), and program and project management (5 percent). Other functions, such as human resources and sales, did not break the 5 percent level. From the seniority viewpoint, the group was almost equally divided between senior positions (Senior Product Manager, Director, Vice President, and Owner) and less experienced professionals (Manager and Entry-level position). Professionals from the following high-technology industries dominated the group: Computer Software (22 percent), Information Technology (15 percent), Telecommunications (10 percent), internet (4 percent), and Marketing and Advertising (4 percent). Other industries like Wireless, Computer Hardware, Semiconductors and others altogether represented 45 percent of respondents, but each of them separately was represented by less than four percent. In a period of nine months, the survey was responded to 201 times. The respondents were not limited by providing any predetermined options, because the problem was approached in an inductive fashion to keep the meanings as open as possible. Moreover, the answers to the survey were open for the respondents, so they could read and see the answers of previous respondents.

Study C investigated the adoption of SPM activities using the reference framework. ISPMA SPM Framework v.1.1 (Fricker, 2012) was chosen because it represents a consensus between industry and academia and integrates previously known reference models. Additionally, having a reference model allowed us to use common terms for PM activities rather than allow the participants to decide how their responsibilities are named. The PM activities were grouped into several questions according to the framework structure (Fricker, 2012). Each question was related to one column of the framework and was formulated as follows: Which of the following activities are/were performed with you feeling responsible for? The first option for answers was exclusive (not leading any XXX practice, where XXX is the name for a group of activities in the framework). Other options were multiple choices and presented a list of activities under particular group of activities in the framework with a short description of each choice like portfolio management (balancing of risks vs return, maintenance vs growth, and short term vs long term). Although there is a difference between feeling responsible and grading the activity as a core activity, we intentionally took this risk. The rationale for taking the risk was product managers' responsibilities are often defined by the higher management and therefore they reflect the organizational context in understanding what the company values in PM.

In total, 46 respondents evaluated their responsibilities and tasks against the given reference framework. Although this number of respondents was not enough to identify success-correlating activities, the survey allowed us to empirically identify the core and supporting PM activities used by product managers in their daily work.

4.3 Summarizing and highlighting the key findings relevant to the synthesis

In Study A, company size was not a criterion that we considered important from the beginning but then we noticed a connection between the company size and what SPM activities the

companies adopted. When analyzing the interviews we focused on the identification of PM activities. In addition, we analyzed how an activity was done and what it included so that we could separate activities with the same name but different content. We grouped all identified activities into four groups. The group of size-independent activities included development, lifecycle management, business analysis, product requirements, and sales. These activities were done similarly in both SMEs and LEs. Both types of companies knew these activities and implemented them similarly, taking into account their own specific characteristics. The group of size-dependent activities included marketing, release planning, roadmapping, strategic and tactical planning. The adoption of these activities was significantly different in different-sized organizations. For example, marketing in the LEs consisted of global, local, and product marketing. In the SMEs, this kind of division was rarely observed, and their understanding of marketing resembled closely public relations (Broom *et al.*, 1991). The group of SME-specific activities included CM, market analysis, and product analysis. We noticed that when talking about SPM activities, the product managers in SMEs concentrated on technical aspects of product development rather than on business aspects. They described development, CM, product requirements, and release planning as the central parts of SPM. Business-oriented activities such as market analysis and product analysis were not considered as important as technical details of the product development. All interviewees in the SMEs mentioned market analysis as a part of SPM, but this activity was sporadic and informal. The group of LE-specific activities included benefits analysis, customer orientation, formal decision making, product portfolio analysis, resource planning, and product support. The product managers in LEs were focused on benefits analysis and customer orientation with much less emphasis on development. They considered development as a black box with a specification as the input and the new version of the product as the output. In comparison with SMEs, which seemed to be more technically oriented, LEs practiced a customer-oriented approach with the focus on analyzing the benefits, which the product provides to the customers. The product managers in LEs were responsible for the identification of customers' needs, and collaboration and communication with customers rather than for technical details of product implementation.

These results can be also viewed from the perspective of core and supporting PM activities. Size-independent and size-dependent PM activities were adopted by all companies, even if their content could differ depending on internal and external factors like the company size, product, and industry domain. In this regard, the activities included in these two groups should contain the core PM activities. LE-specific and SME-specific activities were considered as supporting PM activities.

In Study B, we identified 14 activities related to PM from the practitioners' point of view. Six of these activities were identified as core activities. The respondents stated their primary responsibilities were related to product analysis, which consisted of the identification of unstated customer needs, understanding competitive offerings, and identification of customer needs and wishes. They were also actively involved in roadmapping, and especially in aligning problems with business goals. Product analysis and roadmapping were tightly coupled with strategic management and vision, which have also been considered as core activities in PM (Maglyas *et al.*, 2012). Day-to-day routines in PM consisted of mainly product lifecycle management and internal and external collaboration. Depending on the industry and the managed product, PM included release planning, risk management, customer support, and resource management. Other identified activities included product development, release planning, requirements management, product delivery process, resource management, customer support, portfolio management, and risk management. In comparison with the six activities mentioned above, the involvement of product managers to these activities varied from one product manager to another and from one company to another meaning that product managers were involved into subset of supporting PM activities depending on the organizational structure.

In Study C, we asked the respondents to mark the activities they were responsible for using the reference framework. In more than 75 percent of the responses, the product managers were responsible for five SPM activities: positioning and product definition, business case and costing, roadmapping, release planning, and product requirements engineering. In this regard, these activities represent the core PM activities observed in practice. In addition, all these activities are included in the SPM framework as core activities as well. In general, core activities should be always performed but the 75 percent threshold was set to allow variations in the maturity levels of PM practices in organizations. Setting a higher threshold would be strict to companies that have just started the adoption of SPM and have not adopted all SPM practices yet.

Another set of five SPM activities (innovation management, product analysis, product lifecycle management, project requirements engineering, and product launches) was observed as related to PM by more than 50 percent but less than 75 percent of the respondents. In this regard, these activities represent the supporting PM activities observed in practice. Two of these activities (product analysis and product lifecycle management) are considered as core activities in the reference framework but in practice only some product managers are responsible for these activities. The reference framework defines development, marketing, sales and distribution, and service and support as functions orchestrated but not managed by product managers. However, more than a half of our respondents were responsible for project requirements engineering and product launches, which are activities under development and marketing groups of functions, respectively. Other responses were in line with the framework, meaning that product managers take part in other activities like corporate strategy, sales planning, and others, but these responsibilities are often not their main areas of work.

4.4 Determining how the studies are related

In our synthesis, we adopted the grid described by Britten *et al.* (2002) to compare the studies and to identify the relationships between the categories. The categories in the grid (Table III) represent second-order constructs according to Schutz's (1982) terms. Our interpretations in this stage were quite similar to the original interpretations because the studies were conducted by the same team of researchers, and therefore we operated with similar terms and concepts. This allowed us to compare conclusions regarding the grouping of PM activities without speculations on what was meant by the researchers in the original studies, and therefore this reduced the effect of transparency problems (Campbell *et al.*, 2003).

A summary of the three empirical studies is presented in Table III. The first three rows in the table give a general overview of the conducted studies. They include information about the sample, data collection, and industries where the studies were conducted. In the following two rows, we present the identified main categories with subcategories to enable side-by-side comparison.

4.5 Translating the studies into one another

After the identification of the main and subcategories in individual studies, the next step was to translate the studies into one another (Doyle, 2003). The concepts described in the studies had to be carefully evaluated for their original meaning to avoid speculations of different interpretations (Britten *et al.*, 2002). In our case, we knew exactly what was meant by each concept and what data were behind the concepts described. However, we still had to translate concepts with a consistent terminology. This was especially important for Study A as we interpreted that size-independent and size-dependent activities belong to core activities and that LE-specific activities and SME-specific activities to supporting ones. We were able to establish the relationships between the studies by analyzing the data behind every activity that described their content and by interpreting these activities as core and supporting. In translating the studies into one another, there were some cases where we

Methods and concepts	Study A	Study B	Study C
Sample	17 interviews, 13 companies, 11 documents	201 responses	46 product management professionals
Data collection	Interviews + supporting documentation	Survey with an open-end question	Survey with a reference model
Industries	Software, telecommunication, software-intensive products	Primarily (51%) computer software, IT, telecommunications, internet	Software and software-intensive products in software, medical, and banking industries
Main categories	Size-independent activities, Size-dependent activities, LE-specific activities, SME-specific activities	Core activities, Supporting activities	Core activities, Supporting activities
Subcategories	Size-independent activities Development lifecycle management Business analysis product requirements Sales Size-dependent activities Marketing Release planning Roadmapping Strategic planning Tactical planning LE-specific activities Benefits analysis Customer orientation Formal decision making Product portfolio analysis Resource planning Product support SME-specific activities Configuration management Market analysis Product analysis	Core activities Strategic management Product lifecycle management Roadmapping Internal and external collaboration Vision creation Product analysis Supporting activities Product development Release planning Requirements management Product delivery process Resource management Customer support Portfolio management Risk management	Core activities Positioning and product definition Business case and costing Roadmapping Release planning Product requirements engineering Supporting activities Innovation management Product analysis Product lifecycle management Project requirements engineering Product launches

Table III.
Summary of the three empirical studies

used slightly different names for concepts even if their original meaning was the same. In these cases, we selected the terms that described the concepts more precisely (Table IV).

Table V presents the aligned results of the studies after the translations and interpretations described above.

4.6 Synthesizing translations

The next step is to synthesize the studies. The synthesis was done through dividing all PM activities into core and supporting ones based on the individual studies (Table V). Owing to variations in the adoption of PM and internal practices, there is a variation in activities as core and supporting ones. We recognized organizational structure and variation of PM activities by forming two rules. We synthesized core and supporting PM activities by using the following rules:

- Rule1: the activity is defined as a core PM activity if it was identified as a core activity in all three studies or in two studies as core and in one study as supporting.
- Rule2: the activity is defined as a supporting PM activity if it is not a core activity but it was identified at least twice.

Concept	Studies	Explanation	Changed name
Development	Study 1	We changed the category because it was related to the product rather than whole development	Product development
Lifecycle management	Study 1	We changed the category because in the previous study it was assumed that it is product related activity	Product lifecycle management
Strategic management	Study 2	We narrowed the scope of the activity identified in Study 2 to strategic planning because the top management only was responsible for strategic management at the corporate level	Strategic planning
Product requirements	Study 1	We added the word "engineering" to the term to highlight engineering nature of the process	Product requirements engineering
Requirements management	Study 2	We narrowed the scope of the activity to product requirements only based on the track to the original data	Product requirements engineering
Product portfolio analysis	Study 1	Product portfolio analysis as described in Study 1 was similar to more general term portfolio management and therefore was extended	Portfolio management
Customer support	Study 2	We concluded that the term product support reflects the concept better because it was support related to product only	Product support
Positioning and product definition	Study 3	During internal meetings about positioning and product definition, the product team created vision for their product	Vision creation
Benefit analysis	Study 1	Benefit analysis was discussed during the meeting to decide on advantages and disadvantages of the product	Vision creation

Table IV.
Translation of the studies

	Study 1	Study 2	Study 3
Core activities	Product development, product lifecycle management, business analysis, product requirements engineering, sales, marketing, release planning, roadmapping, strategic planning, and tactical planning	Strategic planning, product lifecycle management, roadmapping, internal and external collaboration, vision creation, and product analysis	Vision creation, business case and costing, roadmapping, release planning, and product requirements engineering
Supporting activities	Vision creation, customer orientation, formal decision making, portfolio management, product support, configuration management, market analysis, and product analysis	Product development, release planning, product requirements engineering, product launches, resource management, product support, portfolio management, and risk management	Innovation management, product analysis, product lifecycle management, project requirements engineering, and product launches

Table V.
Summary of the empirical results after their translation to one another

The rationale behind Rule1 is that core activities should play a critical role in developing and releasing a product to the market successfully and therefore should be constantly observed in the companies that have product managers. However, the roles of product managers vary, and one product manager is seldom responsible for all PM activities (Maglyas *et al.*, 2013). From the perspective of particular manager, some PM activities can be considered as supporting only

because of them being out of his or her responsibilities. To deal with these cases, we included in Rule1 that it is enough to have an activity identified as core in two studies and as supporting in one study. The rationale behind Rule2 is that supporting activities are activities that product managers are not solely responsible for. Their involvement in these activities requires their contribution to and collaboration with other departments. The rule of inclusion of an activity as a supporting one was less strict because we expected a higher level of flexibility in the adoption of supporting PM activities depending on the company and product contexts. We restricted Rule2 by identification of the activity at least twice, because we aim at establishing the essence of PM rather than creating fuzzy boundaries between PM and other disciplines.

4.7 Expressing the synthesis

Applying the logic and the two rules described in the previous section, we identified the following core and supporting PM activities:

(1) Core PM activities:
- vision creation;
- product lifecycle management;
- roadmapping;
- release planning; and
- product requirements engineering.

(2) Supporting PM activities:
- strategic planning;
- portfolio management;
- product analysis;
- product launches;
- product support; and
- product development.

The core PM activities represent the main responsibilities of product managers that were observed in the individual studies. Regardless of many factors involved in the development, releasing, and launching a product to the market, these activities were adopted as core SPM in the companies. Supporting PM activities were activities that most product managers were partially responsible for. However, these activities were not strictly adopted in all companies, and it is reasonable to expect variation of responsibilities between product managers involved in these activities.

The rest of the activities could be defined neither as core nor as supporting ones. Thus, they represent a variation of PM activities in different contexts. Any framework represents a synthesis of activities because this is the goal of abstraction. Therefore, we differentiate core, supporting, and other activities explicitly and emphasize that these other PM activities can fit in some contexts as well.

5. Discussion

Using the meta-ethnography approach, we synthesized the results obtained in the individual studies to identify core and supporting PM activities. Additionally, we identified some level of disagreement between the studies, which resulted in the identification of variations in the adoption of PM activities that cannot be assigned either as core or as supporting ones.

In this section, we discuss the research results in more detail through their practical contribution to PM research and theoretical implications and contribution to SPM research.

5.1 Practical contribution to SPM

Empirical investigation of the companies in the industry showed that the focus on the activities varies depending on the company size. Although large enterprises are focused on being customer oriented, SMEs do not have enough resources to compete with them in this area (Maglyas *et al.*, 2012). This has an implication on how SPM should be organized to meet the business goals. As a company grows, its focus shifts to other SPM activities; however, some activities remain necessary for any company regardless its size. An attempt to adopt all SPM activities instantly has been identified as a common problem in PM (Maglyas *et al.*, 2012). The source of this mistake is often hidden in the attempts to make major changes in the company processes or introducing too many new activities instantly (Nikula *et al.*, 2010). Therefore, starting with core and supporting activities and then introducing other components of PM iteratively should help companies to make the process of the PM adoption easier.

Comparison of our results with existing PM frameworks (Ebert, 2009; Pragmatic Marketing, 2014; ISPMA, 2014; van de Weerd *et al.*, 2006a, b) is presented in Table VI below. All core PM activities, except vision, identified in this study, are also presented as core activities in the ISPMA SPM Framework v1.1 (Fricker, 2012). Vision as an activity is not included in any of the frameworks. These frameworks have usually vision embedded or combined with other activities. For example, the ISPMA SPM framework has a core activity of positioning and product definition, and SPM processes include positioning and value proposition as one of the PM processes.

In comparison with the Pragmatic Marketing Framework (Pragmatic Marketing, 2014), only two of the five core and three of the six supporting activities correspond with our results. Although we consider the Pragmatic Marketing Framework as related to PM, it mainly includes activities related to product marketing and general management (Pragmatic Marketing, 2014). In this regard, it is of no surprise that core PM activities like requirements and roadmapping are discussed in both frameworks. However, the limited overlap in the activities points out

	Reference SPM framework (van de Weerd *et al.*, 2006a, b)	Software product management processes (Ebert, 2009)	Pragmatic marketing framework (Pragmatic Marketing, 2014)	ISPMA SPM Framework v.1.1 (Fricker, 2012)
Core				
Release planning	✓	✓		✓*
Product lifecycle management	✓			✓*
Roadmapping	✓	✓	✓	✓*
Vision				
Product requirements engineering	✓	✓	✓	✓*
Supporting				
Portfolio management	✓		✓	✓
Product analysis				✓*
Strategic planning		✓		
Product support			✓	✓
Product development				
Product launches	✓	✓	✓	✓

Note: *, core activities

Table VI. Comparison of the results with existing product management frameworks

differences in PM and product marketing activities. The reference SPM framework mainly concentrates on the elicitation and prioritization of product requirements and in this regard overlaps only in the activities related to defining, implementing, and changing features in products (van de Weerd *et al.*, 2006a, b). The list of PM processes described by Ebert (2009) overlaps with the activities we identified. Additionally, only this list has strategic planning as a PM activity, which was also identified as a supporting activity in our results. Product development is included in the reference SPM framework as an external stakeholder, and as a set of activities orchestrated by the product manager in the ISPMA SPM framework. However, it is not included as a separate activity in any of these frameworks.

Overall, of the five core PM activities identified, two or more of them are present in all the existing PM frameworks. The supporting activities overlap partially with the ISPMA SPM Framework (ISPMA, 2014), the reference SPM framework (van de Weerd *et al.*, 2006a, b), and Ebert's list of PM processes (Ebert, 2009). All the four frameworks consider requirements engineering and roadmapping as activities related to PM owing to its importance for prioritizing, selecting features to be implemented, and managing the product through its lifecycle (Lehtola and Kauppinen, 2006). Other activities that are neither core nor supporting ones explain the role of the product manager as a "linking pin," which connects the top management with the lower-level managers, as product managers have an ability to mediate between strategic and operational levels. Depending on the current tasks, a product manager can be involved in defining corporate strategy or in planning a marketing campaign, or in some other activities. However, based on the collected data, there is no evidence that a product manager is constantly involved in these activities, and therefore they were left out of the core and supporting PM activities.

The number of PM activities was reduced from up to forty activities described in PM frameworks to five core and six supporting PM activities. We consider this as a simplification that should have a significant effect on the adoption of SPM by providing guidelines for which SPM activities should be implemented first. Deviant activities that have not been included as core or supporting ones provide us with additional material for a different perspective and make "a new space for understanding […] as qualitative inquiry rarely results in complete congruence of meaning" (Walsh and Downe, 2005).

Together with the stereotypical profiles of software product managers identified earlier (Schutz, 1982), core and supporting PM activities represent two of the three vertexes of the triangle roles-activities-artifacts (Curtis *et al.*, 1992) also referred to as a typical process model (Dowson *et al.*, 1990). These three elements form a triangle representing the basic model on what should be done (artifacts), who is responsible for it (roles), and what actions should be performed to create or modify the artifact (activities). Therefore, this model represents a core set of characteristics describing some basics of a discipline and representing a common communication framework for the stakeholders involved in a process (Feiler and Humphrey, 1993; Lonchamp, 1993). In this regard, the present study contributes to the foundation of PM as a discipline.

The identified five core and six supporting PM activities should be of interest to almost all product managers, regardless of the product and the business domain. Therefore, they can have a positive effect on PM education and the way it should be organized to meet the expectations of PM professionals. As in practice "even within the software industry, the definition and role of the Product Manager varies widely" (Dver, 2003). The identified activities create a necessary skill set required of a product manager, and therefore the results have an effect on the common understanding of product managers' recruitment requirements. It is reasonable to expect that every product manager is familiar with the core PM activities, whereas the other skills may vary depending on the background, business domain, and product type.

Companies adopt SPM differently, and company size can act as an indicator of changes in the adoption of SPM activities. The empirical investigation showed what other activities,

in addition to core and supporting ones, may be implemented in companies depending on the company domain or type of product. For practitioners, this means that the adoption of SPM activities in a particular case should start from choosing the activities playing the most important role for the company, and core SPM activities are good candidates to start with. The adoption of all activities instantly may result in a waste of limited resources without significant results in the management of software products (Maglyas *et al.*, 2012). For example, there is no need to support every decision with careful research analysis when resources are limited, because an organizational structure can allow the managers to proceed intuitively (Christensen and Overdorf, 2000). In this regard, the efforts for building a strong hierarchy between PM, marketing, and development departments may be considered as a waste of resources (Karlsson and Olsson, 1998).

5.2 Theoretical implications and contributions to SPM research

Synthesizing the research results of qualitative studies using the meta-ethnography approach appears to produce feasible results, but the synthesis results are subject to critical evaluation. The key challenge is dealing with philosophical assumptions that the authors of individual studies have used in their studies (Atkins *et al.*, 2008). The underlying phenomenological assumptions have an effect on how the interpretive studies can be synthesized. For example, Sandelowski *et al.* (1997) argue that synthesis of qualitative studies with different epistemological foundations is not feasible because each study shares a unique set of context, views, theories, and methods. The primary concern is about losing the explanatory context of individual studies when they are combined in the synthesis (Finfgeld, 2003). As the individual studies context is important for credibility of the results, a meta-ethnography should retain the rich context of the data. However, it might be difficult owing to poor reporting of contextual information in the studies selected for the synthesis (Atkins *et al.*, 2008). Some authors in clinical research have approached this problem by selecting the studies undertaken in a particular context, e.g. Smith *et al.* (2005), but the problem remains as a challenge for meta-ethnographic studies (Atkins *et al.*, 2008). We approached this problem by selecting our own studies for the synthesis to avoid misinterpretation of constructs and losing of the study context. By making this decision, we acknowledge the central tenet of constructivist research that the interpretations should be made by a single investigator or the same team of researchers (Walsh and Downe, 2005; Sandelowski *et al.*, 1997). However, we are aware that by selecting our own studies only, we deliberately miss the exploration of multiple viewpoints.

The meta-ethnography approach, being an example of qualitative synthesis, shares challenges of other qualitative studies like reproducibility and inherent subjectivity of interpretation. As the meta-ethnography involves interpretation, the synthesis results are influenced by researchers, and their interpretations may vary. It has been highlighted that qualitative synthesis is different from quantitative and "cannot be reduced to mechanical tasks" (Britten *et al.*, 2002). As the process of deriving third-order interpretations from first- and second-order interpretations is not clearly defined (Britten *et al.*, 2002; Atkins *et al.*, 2008), comparison of different meta-ethnographies based on the same topic or on the same set of studies is not straightforward and also subject to interpretation. The recurrence of themes across combined studies has been considered as having a positive effect on validity (Estabrooks *et al.*, 1994). In addition, some authors (Paterson *et al.*, 2001; Thorne *et al.*, 2002) propose to get back to original researchers to confirm that integrity and interpretation of the original studies have not been threatened by the synthesis. In this study, we were the original researchers and therefore we were able to continuously get back to the original data and interpretations when conducting the synthesis to ensure that the synthesized results correspond with original studies. In this regard, it enhanced the trustworthiness as proposed by Paterson *et al.* (2001) and Thorne *et al.* (2002).

The selection of studies for inclusion into a meta-ethnography is often done through an extensive search to locate all relevant studies within the selected topic (Finfgeld-Connett, 2010). The complicated synthesis process also limits the number of studies that can be included into the synthesis. Therefore, some qualitative researchers propose to adopt sampling strategies to selecting the studies for the synthesis like theoretical sampling (Dixon-Woods *et al.*, 2005). The selection of a large number of studies for the quantitative synthesis is used for addressing generalizability of the synthesis by selecting large random samples. However, generalizability of qualitative studies is different, and it requires a wide sampling set of studies that investigates the phenomenon from different perspectives rather than a large number of studies (Lee and Baskerville, 2003). The generalizability of the study is based on the increasing level of abstraction from individual studies to the meta-ethnography. The more abstract the concepts become, the wider the scope of the developed theory is. In this study, we generalize from empirical statements of individual studies to a mid-range theory, or in other words, use type ET (from Empirical to Theoretical statements) of generalizability according to the classification of Lee and Baskerville (2003).

According to the Gregor's (2006) taxonomy, the created theory relates to the analysis type of theories. This type includes descriptions and conceptualizations of "what is." However, the theory of core and supporting SPM activities can be partially considered as a design and analysis type of theory, because we also describe "how to do things," e.g., what SPM activities should be of primary focus in companies that adopt SPM. With the three individual studies, the scope of validity of the theory is still limited, and therefore, more studies would be useful for covering the scope of interest better (Sjøberg *et al.*, 2008). Nevertheless, the meta-ethnography already presents an increased level of abstraction in comparison to the set of individual studies (Campbell *et al.*, 2003). In this regard, the results of the study can be considered as a mid-range theory that involves some abstraction but is still coupled with the original data (Merton, 1968).

Addressing the lack of software engineering theories (Hannay *et al.*, 2007; Sjøberg *et al.*, 2008), we also reflect on the process of conducting a meta-ethnography study as the process has raised concerns of other researchers, including the concerns of unclear sampling strategies and deprivation of contextual information (Britten *et al.*, 2002; Walsh and Downe, 2005; Atkins *et al.*, 2008; Finfgeld-Connett, 2010). We address these concerns by selecting our own studies for the synthesis. This has been recognized as one of the possible approaches to conducting the synthesis (Sandelowski *et al.*, 1997), but it is not free from the challenges, because it lacks multiple viewpoints to the phenomenon (Walsh and Downe, 2005). However, we consider this approach as less risky, because it does not deprive the study of contextual information due to unavailability of original data.

5.3 Limitations

As we have changed the original guidelines of Noblit and Hare (1988), we have to address the new method validation issue. However, the changes were incremental, and they did not introduce major changes in the process itself. Our primary concerns were related to the preparation steps to the synthesis when the selection and description of individual studies are made. Sandelowski *et al.* (1997) consider the synthesis of own studies as a possible approach to the meta-ethnography. Therefore, we introduced the changes to the Noblit and Hare guidelines to describe the decisions related to choosing sampling strategy, selecting research questions, and describing individual studies. These changes were required because we selected our own individual studies rather than looked for all available relevant studies in digital databases. Our previous studies on PM were based on existing relevant studies in digital databases and therefore those studies included the results of PM research.

Although the meta-ethnography approach was initially developed for synthesizing ethnographical studies, we applied it to two grounded theory studies and one survey. Recently,

there have been discussions about synthesizing the studies from different epistemological perspectives, primarily about concerns related to validity and generalizability (Finfgeld-Connett, 2010; Sandelowski *et al.*, 1997). However, there is increasing evidence that combining different perspectives in the synthesis enhances the truth value (Finfgeld, 2003). Therefore, our selection of the grounded theory studies together with the survey does not appear to bring additional threats to the results validity. Instead, it enhances generalizability and validity of the results through the second-tier triangulation similar to the first-tier triangulation of qualitative studies, but applied to the meta-ethnography (Finfgeld-Connett, 2010).

The one criterion for when enough data are collected is "saturation" (Strauss and Corbin, 2008). It means that no new information or viewpoint is gained from new subjects (Strauss and Corbin, 2008; Runeson and Höst, 2009). The concept of saturation was used in all three studies to ensure that they have managed to achieve it (Maglyas *et al.*, 2012; Maglyas and Fricker, 2014). It was done to ensure that the selected studies are suitable for their inclusion into a meta-ethnography. Saturation occurs when each new case does not make any substantive difference to the topic of the study. The research team recognizes that the responses of the interview are unchanged or similar with each new interview (Runeson and Höst, 2009). However, because the limitations of original studies exist, we aimed at decreasing them by complimenting them with examples from other studies and summarizing the results from different studies. Saturation is not a quantitatively measurable entity but is still a feasible criterion when judging the validity (Runeson and Höst, 2009).

6. Conclusions

We have presented the meta-ethnography study that classified the evidence from primary empirical studies and grouped PM activities into core and supporting ones. The development and release of a new product include many interrelated activities, which may become a source of complexity in PM because of a multitude of activities that must be conducted, orchestrated, or managed. Our results show that the core PM activities are product lifecycle management, product requirements engineering, release planning, roadmapping, and vision. Additionally, other six activities support the development of a new product to the market. These supporting activities are portfolio management, product analysis, strategic planning, product support, product development, and product launches. The study adds to the body of knowledge in SPM by contributing to the foundations of SPM.

The results of the study were obtained by adopting the meta-ethnography approach to the synthesis of individual studies. The synthesis of individual studies has not been widely adopted in software engineering research yet. This study provides an example of applying the meta-ethnography approach in empirical software engineering. Additionally, we illustrate how to use the meta-ethnography approach for synthesizing own studies.

References

Al-Janabi, H., Coast, J. and Flynn, T.N. (2008), "What do people value when they provide unpaid care for an older person? A meta-ethnography with interview follow-up", *Social Science & Medicine*, Vol. 67 No. 1, pp. 111-121.

Atkins, S., Lewin, S., Smith, H., Engel, M., Fretheim, A. and Volmink, J. (2008), "Conducting a meta-ethnography of qualitative literature: lessons learnt", *BMC Medical Research Methodology*, Vol. 8 No. 1, pp. 21-31.

Boehm, B. (2003), "Value-based software engineering: reinventing", *ACM Software Engineering Notes*, Vol. 28 No. 3, pp. 3-6.

Borden, N. (1965), "The concept of the marketing mix", *Journal of Advertising Research*, Vol. 5 No. 2, pp. 7-12.

Britten, N., Campbell, R., Pope, C., Donovan, J., Morgan, M. and Pill, R. (2002), "Using meta ethnography to synthesise qualitative research: a worked example", *Journal of Health Services Research and Policy*, Vol. 7 No. 4, pp. 209-215.

Broom, G.M., Lauzen, M.M. and Tucker, K. (1991), "Public relations and marketing: dividing the conceptual domain and operational turf", *Public Relations Review*, Vol. 17 No. 3, pp. 219-225.

Campbell, R., Pound, P., Pope, C., Britten, N., Pill, R., Morgan, M. and Donovan, J. (2003), "Evaluating meta-ethnography: a synthesis of qualitative research on lay experiences of diabetes and diabetes care", *Social Science & Medicine*, Vol. 56 No. 4, pp. 671-684.

Carroll, W.J. and Grimes, R.C. (1995), "Evolutionary change in product management: experiences in the car rental industry", *Interfaces*, Vol. 25 No. 5, pp. 84-104.

Christensen, C. and Overdorf, M. (2000), "Meeting the challenge of disruptive change", *Harvard Business Review*, Vol. 78 No. 2, pp. 66-72.

Condon, D. (2002), *Software Product Management: Managing Software Development from Idea to Product to Marketing to Sales*, 1st ed., Aspatore Books, New York, NY.

Corbin, J. and Strauss, A. (1990), "Grounded theory research: procedures, canons, and evaluative criteria", *Qualitative Sociology*, Vol. 13 No. 1, pp. 3-21.

Curtis, B., Kellner, M.I. and Over, J. (1992), "Process modeling", *Communications of the ACM*, Vol. 35 No. 9, pp. 75-90.

Da Silva, F.Q.B., Cruz, S.S.J.O., Gouveia, T.B. and Capretz, L.F. (2013), "Using meta-ethnography to synthesize research: a worked example of the relations between personality and software team processes", *2013 ACM/IEEE International Symposium on Empirical Software Engineering and Measurement*, pp. 153-162.

Dixon-Woods, M., Agarwal, S., Jones, D., Young, B. and Sutton, A. (2005), "Synthesising qualitative and quantitative evidence: a review of possible methods", *Journal of Health Services Research & Policy*, Vol. 10 No. 1, pp. 45-53.

Dowson, M., Nejmeh, B. and Riddle, W. (1990), "Concepts for process definition and support", 6th International Software Process Workshop, Hakodate, pp. 87-90.

Doyle, L.H. (2003), "Synthesis through meta-ethnography: paradoxes, enhancements, and possibilities", *Qualitative Research*, Vol. 3 No. 3, pp. 321-344.

Dver, A. (2003), *Software Product Management Essentials*, Meghan Kiffer Pr, New York, NY.

Ebert, C. (2007), "The impacts of software product management", *Journal of Systems & Software*, Vol. 80 No. 6, pp. 850-861.

Ebert, C. (2009), "Software product management", *Crosstalk*, Vol. 22 No. 1, pp. 15-19.

Estabrooks, C.A., Field, P.A. and Morse, J.M. (1994), "Aggregating qualitative findings: an approach to theory development", *Qualitative Health Research*, Vol. 4 No. 4, pp. 503-511.

Feiler, P.H. and Humphrey, W.S. (1993), "Software process development and enactment: concepts and definitions", *2nd International Conference on Continuous Software Process Improvement*, pp. 28-40.

Finfgeld, D.L. (2003), "Metasynthesis: the state of the art – so far", *Qualitative Health Research*, Vol. 13 No. 7, pp. 893-904.

Finfgeld-Connett, D. (2010), "Generalizability and transferability of meta-synthesis research findings", *Journal of Advanced Nursing*, Vol. 66 No. 2, pp. 246-254.

Fricker, S.A. (2012), "Software product management", in Maedche, A., Botzenhardt, A. and Neer, L. (Eds), *Software for People*, Springer, Berlin and Heidelberg, pp. 53-81.

Gorchels, L. (2000), *The Product Manager's Handbook: The Complete Product Management Resource*, 2nd ed., McGraw-Hill, New York, NY.

Gorschek, T., Fricker, S., Palm, K. and Kunsman, S. (2010), "A lightweight innovation process for software-intensive product development", *IEEE Software*, Vol. 27 No. 1, pp. 37-45.

Gregor, S. (2006), "The nature of theory in information systems", *MIS Quarterly*, Vol. 30 No. 3, pp. 611-642.

Haines, S. (2008), *The Product Manager's Desk Reference*, McGraw-Hill, New York, NY.

Hannay, E., Sjoberg, D. and Dyba, T. (2007), "A systematic review of theory use in software engineering experiments", *IEEE Transactions on Software Engineering*, Vol. 33 No. 2, pp. 87-107.

ISPMA (2014), "International Software Product Management Association (ISPMA)", August 4, available at: http://ispma.org

Jager, W. (2007), "The Four P's in social simulation, a perspective on how marketing could benefit from the use of social simulation", *Journal of Business Research*, Vol. 60 No. 8, pp. 868-875.

Karlsson, C. and Olsson, O. (1998), "Product innovation in small and large enterprises", *Small Business Economics*, Vol. 10 No. 1, pp. 31-46.

Kilpi, T. (1997a), "Choosing a SCM-tool: a framework and evaluation", *Presented at the 8th Conference on Software Engineering Environments*, pp. 164-172.

Kilpi, T. (1997b), "New challenges for version control and configuration management: a framework and evaluation", *First Euromicro Conference on Software Maintenance and Reengineering, EUROMICRO'97*, pp. 33-41.

Kilpi, T. (1998), "Improving software product management process: implementation of a product support system", *Presented at the 31th Hawaii International Conference on System Sciences,* Vol. 6, pp. 3-12.

Kittlaus, H.-B. and Clough, P. (2009), *Software Product Management and Pricing: Key Success Factors for Software Organizations*, Springer, Berlin Heidelberg.

Konig, S.J. (2009), "Finance as a stakeholder in product management", presented at the Third International Workshop on Software Product Management (IWSPM), Atlanta, GA, pp. 15-22.

Lee, A.S. and Baskerville, R.L. (2003), "Generalizing generalizability in information systems research", *Information Systems Research*, Vol. 14 No. 3, pp. 221-243.

Lehtola, L. and Kauppinen, M. (2006), "Suitability of requirements prioritization methods for market-driven software product development", *Software Process: Improvement and Practice*, Vol. 11 No. 1, pp. 7-19.

Lonchamp, J. (1993), "A structured conceptual and terminological framework for software process engineering", *2nd International Conference on Continuous Software Process Improvement*, pp. 41-53.

Maglyas, A. and Fricker, S. (2014), "The preliminary results from the software product management state-of-practice survey", in Lassenius, C. and Smolander, K. (Eds), *Software Business: Towards Continuous Value Delivery*, Springer International Publishing, Paphos, pp. 295-300.

Maglyas, A., Nikula, U. and Smolander, K. (2012), "Comparison of software product management practices in SMEs and large enterprises", *Presented at the 3rd International Conference on Software Business (ICSOB)*, pp. 15-26.

Maglyas, A., Nikula, U. and Smolander, K. (2012), "Lean solutions to software product management problems", *IEEE Software*, Vol. 29 No. 5, pp. 40-46.

Maglyas, A., Nikula, U. and Smolander, K. (2012), "What do practitioners mean when they talk about product management?", *Presented at the 20th IEEE International Requirements Engineering Conference (RE)*, pp. 261-266.

Maglyas, A., Nikula, U. and Smolander, K. (2013), "What are the roles of software product managers? An empirical investigation", *Journal of Systems and Software*, Vol. 86 No. 12, pp. 3071-3090.

Merton, R.K. (1968), *Social Theory and Social Structure*, The Free Press, New York, NY, pp. 39-72.

Messerschmitt, D. and Szyperski, C. (2003), *Software Ecosystem: Understanding an Indispensable Technology and Industry*, MIT Press, Boston, MA.

Nikula, U., Jurvanen, C., Gotel, O. and Gause, D.C. (2010), "Empirical validation of the classic change curve on a software technology change project", *Information and Software Technology*, Vol. 52 No. 6, pp. 680-696.

Noblit, G.W. and Hare, R.D. (1988), *Meta-Ethnography: Synthesizing Qualitative Studies*, Sage Publications, Newbury Park, CA.

Ojala, P. (2008), "Experiences of implementing a value-based approach to software process and product assessment", *Presented at the 2nd WSEAS International Conference on Computer Engineering and Applications, Stevens Point, WI*, pp. 34-39.

Paterson, B.L., Thorne, S.E., Canam, C. and Jillings, C. (2001), *Meta-Study of Qualitative Health Research: A Practical Guide to Meta-Analysis and Meta-Synthesis*, 1st ed., SAGE Publications, Inc, Thousand Oaks, CA.

Pragmatic Marketing (2010), "The Annual Product Management and Marketing Survey," available at: www.pragmaticmarketing.com/publications/survey/2010 (accessed August 4, 2015).

Pragmatic Marketing (2014), "Pragmatic marketing", August 4, available at: www.pragmaticmarketing.com/ (accessed 4 August 2015).

Runeson, P. and Höst, M. (2009), "Guidelines for conducting and reporting case study research in software engineering", *Empirical Software Engineering*, Vol. 14 No. 2, pp. 131-164.

Sandelowski, M., Docherty, S. and Emden, C. (1997), "Focus on qualitative methods: qualitative metasynthesis: issues and techniques", *Research in Nursing & Health*, Vol. 20 No. 4, pp. 365-371.

Schütz, A. (1971), *Collected Papers, Vol. 1*, Kluwer Academic Publishers, The Hague and Dordrecht.

Schutz, A. (1982), *Collected Papers Volume I*, Kluwer Academic Publishers, Dordrecht and Boston, MA and London.

Siau, K. and Long, Y. (2005), "Synthesizing e-government stage models – a meta-synthesis based on meta-ethnography approach", *Industrial Management & Data Systems*, Vol. 105 No. 4, pp. 443-458.

Sjøberg, D.I.K., Dybå, T., Anda, B.C.D. and Hannay, J.E. (2008), "Building theories in software engineering", in Shull, F., Singer, J. and Sjøberg, D.I.K. (Eds), *Guide to Advanced Empirical Software Engineering*, Springer, London, pp. 312-336.

Smith, L.K., Pope, C. and Botha, J.L. (2005), "Patients' help-seeking experiences and delay in cancer presentation: a qualitative synthesis", *The Lancet*, Vol. 366 No. 9488, pp. 825-831.

Steinhardt, G. (2010), *The Product Manager's Toolkit: Methodologies, Processes and Tasks in High-Tech Product Management*, Springer, Berlin Heidelberg.

Strauss, A. and Corbin, J. (2008), *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*, 3rd ed., Sage Publications, London.

Strike, K. and Posner, G. (1983), "Types of synthesis and their criteria", in Ward, S.A. and Reed, L.J. (Eds), *Knowledge Structure and Use: Implications for Synthesis and Interpretation*, Temple University Press, Philadelphia, pp. 343-362.

Thorne, S., Paterson, B., Acorn, S., Canam, C., Joachim, G. and Jillings, C. (Apr. 2002), "Chronic illness experience: insights from a metastudy", *Qualitative Health Research*, Vol. 12 No. 4, pp. 437-452.

Toffel, M.W. (2003), "The growing strategic importance of end-of-life product management", *California Management Review*, Vol. 45 No. 3, pp. 102-130.

van de Weerd, I. and Katchow, R. (2009), "On the integration of software product management with software defect management in distributed environments", *Presented at the 5th Central and Eastern European Software Engineering Conference (CEE-SECR)*, pp. 167-172.

van de Weerd, I., Brinkkemper, S., Nieuwenhuis, R., Versendaal, J. and Bijlsma, L. (2006), "On the creation of a reference framework for software product management: validation and tool support", presented at the International Workshop on Software Product Management (IWSPM), pp. 3-12.

van de Weerd, I., Brinkkemper, S., Nieuwenhuis, R., Versendaal, J. and Bijlsma, L. (2006), "Towards a reference framework for software product management", *Presented at the 14th IEEE International Conference on Requirements Engineering*, pp. 319-322.

Walsh, D. and Downe, S. (2005), "Meta-synthesis method for qualitative research: a literature review", *Journal of Advanced Nursing*, Vol. 50 No. 2, pp. 204-211.

Yin, R. (2002), *Case Study Research: Design and Methods*, 3rd ed., Sage Publications, London.

Further reading

Barney, S., Aurum, A. and Wohlin, C. (2008), "A product management challenge: creating software product value through requirements selection", *Journal of Systems Architecture*, Vol. 54 No. 6, pp. 576-593.

Malpass, A., Shaw, A., Sharp, D., Walter, F., Feder, G., Ridd, M. and Kessler, D. (2009), "'Medication career' or 'Moral career'? The two sides of managing antidepressants: a meta-ethnography of patients' experience of antidepressants", *Social Science & Medicine*, Vol. 68 No. 1, pp. 154-168.

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