What Are the Roles of Software Product Managers? An Empirical Investigation

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ABSTRACT
Software product management covers both technical and business activities to management of products like roadmaps, strategic, tactical, and release planning. In practice, one product manager is seldom responsible for all these activities but several persons share the responsibilities. Therefore, it is important to understand the boundaries of product managers’ work in managing software products, as well as the impact a product manager has on the company business. The purpose of the study is to clarify what roles of software product managers exist and understand how these roles are interrelated with each other and the whole structure and business of an organization. The study is designed as an interpretative qualitative study using grounded theory as the research method. Based on the gathered data we developed a framework that reveals the role of a product manager in the organization and shows how this role can evolve by extending the level of responsibilities. Using the framework, we identified four stereotypical roles of product managers in the studied organizations: experts, strategists, leaders, and problem solvers. The presented framework shows that product managers’ roles are not limited to the conception of the “mini-CEO.” The results allow product managers and top management to collaborate effectively by assigning responsibilities and managing expectations by having a common tool for understanding the role of product managers in the organization.

Keywords: software product management, stereotypical profile roles, management roles, qualitative research, interpretive study, grounded theory
1 INTRODUCTION

Software product management (SPM) is “the discipline and role, which governs a product (or solution or service) from its inception to the market/customer delivery in order to generate biggest possible value to the business” (Ebert, 2009). Previous research indicates that software product management plays an important role in increasing the success rate of projects (Ebert, 2007). In the telecommunication industry, the focus on software product management allowed a company to reduce the cycle time in a business unit by 36% compared to the initial estimation. SPM had also a positive impact on the quality, which was improved by 80% with product management practices (Ebert, 2007). Other benefits of SPM include increased profitability and predictability of software product lifecycle in accordance with the business goals of the company (van de Weerd et al., 2006a). More generally, software product management plays a critical role in managing and achieving business goals by providing practices for the winning strategy in the market (Kittlaus and Clough, 2009).

Existing software product management frameworks describe many activities in which a product manager is involved, including strategy and vision definition, roadmap planning, release planning, pricing, product development and others (Ebert, 2009; Kittlaus and Clough, 2009; van de Weerd et al., 2006a). Due to the high number of activities, one person is not able to be responsible for all of them. This leads to a situation where responsibilities are shared in the organization, and therefore the role of a particular product manager, as well as the whole product management in the organization become difficult to track and understand.

The role of a product manager is often described as a product “mini-CEO” (Dver, 2003; Gorchels, 2000), who unites the technical and business perspectives on the managed product. In this regard, the role of the product manager may be compared with the Chief Information Officer (CIO) role, which has been studied earlier (Chun and Mooney, 2009; Johnson and Lederer, 2010; Sobol and Klein, 2009). A CIO as an executive-level manager focuses on the organization’s strategy and processes and acts as a technical manager minimizing the costs of the existing infrastructure. Therefore, these two roles are similar in their responsibilities but differ from the management point of view: the CIO works at the corporate level while the product manager works at the product level. The CIO also plays an important role in cultivating a mutual understanding with the Chief Executive Officer (CEO) of information systems and IT infrastructure in the organization (Johnson and Lederer, 2010). The role of the product manager is similar to that of the CIO, but the product manager is responsible for developing a product strategy in agreement with the top management.

Although the role of product manager significantly varies from one organization to another, we need to understand the responsibilities and roles of product managers in software organizations in order to determine if the product manager “mini-CEO” role is the only possible role observed in practice or other roles exist as well. It would help us to draw conclusions on how the frameworks and SPM practices should be further developed in light of the new knowledge and new roles. The identification of product manager’s roles would also help software product managers to find the direction for their career and skill development in alliance with the company strategy. Taking into account that organizations have more than one product manager responsible for the developed product, we aim in identifying the roles held by software product managers from junior to senior positions to clarify how the responsibilities may be shared in an organization. In order to identify and classify these roles, we studied product management practices in 13 organizations with the aim to answer the following research question:
RQ: “Which common roles do software product managers fulfil in organizations?”

The result of this study is a framework that allows researchers and practitioners to identify, describe and compare the responsibilities of software product managers. With this framework we identified four stereotypical roles for software product managers.

The rest of the paper is organized as follows: Section 2 introduces the theoretical background of product management in general and software product management in particular. In Section 3 we describe the research methodology. Section 4 presents the developed Software Product Management Roles Framework (SPMRF). Section 5 describes four stereotypical profiles of product managers. In Section 6 the results of the study and its implications are discussed. Finally, Section 7 closes the paper.

2 RELATED RESEARCH

2.1 Product management

Product management is not a new discipline. The concept of product management was first introduced in Procter&Gamble in 1931 (Gorchels, 2000). The company hired a special person, a brand manager, who was responsible for managing one product. After this successful experience the practice of assigning product managers to a product or a product line was copied inside the company. Later, the practice of hiring product managers spread also outside the company and was adopted by competitors (Gorchels, 2000).

As product management was adopted in many business organizations, the concept gained popularity and became a topic for scientific research. In the early 1960s, Borden (Borden, 1965) created the model of the four P’s of marketing, consisting of product, place, price, and promotion. In this model, product includes issues related to the creation and development of a product. Place is a process of defining the right markets in which the product will be marketed and sold. Price considers financial issues in collaboration with financial analysts. Promotion includes activities related to advertisement (Borden, 1965). The model can be seen as one of the first theories about product management.

The Annual Product Management and Marketing Survey (Pragmatic Marketing, 2010a) explores the responsibilities of product managers. According to this survey in 2010, the most frequent activities of product managers included the product roadmap (91%), requirements (86%), market problems (77%), use scenarios (74%), and competitive landscape (73%). Except market problems, other activities are related to the technical discipline. The market problems activity is related to the strategic discipline (Pragmatic Marketing, 2010b). Therefore, product managers are typically involved in researching the market and writing requirements. In the case of a lack of a product marketing manager or another person responsible for planning the go-to-market strategy, product managers can take these responsibilities as well (Dver, 2003).

The product manager is described as a product champion who is responsible for the execution of the business plan to provide the biggest possible value for the customers (Dver, 2003). The literature describes a product manager as a leader and a champion who makes all the decisions and acts as a problem solver. The annual survey (Pragmatic Marketing, 2010a), however, shows that the role of a product manager is unclear, and he or she wears many hats, depending on the company size, business and domain.
The activities of a product manager include identification of the features that provide significant value for the customers by communicating and defining customer needs, market trends, competitors, and markets for selling. The product manager plays the role of a facilitator between different departments; he or she is a “mini-CEO” who is responsible for one or several products (Ebert, 2009). The product manager works in close collaboration with the product development team, marketing team, project managers, financial analysts and managers, engineering and sales teams, using these departments as resources to produce successful products. The role of a product manager varies widely from one organization to another. In some cases, the product manager focuses on marketing and his or her responsibilities include brand management, sales support and marketing (Dver, 2003). In other cases, brand management is a separate discipline within the organization, and the product manager works as a mediator between sales and engineering, gathering product requirements and creating specifications (Gorchels, 2000). The product manager can also have the function of a business manager who is responsible for a product and product team (Dver, 2003). As a result, it is difficult to define the role of the product manager in an organization, because the job title does not provide a clear idea of the role and the responsibility. Thus, the idea of product management has existed for a long time, but the role of the product manager in an organization is still not clearly defined.

2.2 Software product management

Software has several characteristics that distinguish it from other products. Firstly, software can be relatively easily changed, and several versions of a product are easy to introduce in the market (Cusumano, 2008). This also leads to tough competition, because new features are reproduced and improved by competitors. Secondly, it has been claimed that software is the most complex and sophisticated product of human invention that we currently know (Kittlaus and Clough, 2009; Messerschmitt and Szyperski, 2003). For example, one source of complexity is the nature of software, consisting of many blocks from different vendors along with the possibility to run the software at a hardware manufactured by other vendors. This can lead to incompatibilities between components, which should be taken into account in product development and decision making. To respond to such challenges, a huge number of factors must be considered in software product development. This leads to the division of responsibilities between developers, testers, project managers, product managers, and many other roles supporting software development. Thirdly, in software production, processes and logistics have only limited importance, even though they play an important role in goods production. In software development “knowledge” is more essential than physical artifacts (Kittlaus and Clough, 2009). The cost of producing and delivering an additional copy of software is small compared to the other costs. In addition, the existing infrastructure, including the Internet, makes the logistics simple.

The differences described above affect the application of product management to software. The existing software product management frameworks (Ebert, 2009; Kittlaus and Clough, 2009; van de Weerd et al., 2006b) can be used to explain the structure of software product management. There are many overlapping parts in these frameworks, even though the terminology is different. For example, software product management components can be defined as functions (Kittlaus and Clough, 2009), activities (Ebert, 2009), or process areas (van de Weerd et al., 2006b), depending on the framework.

The Software Product Management Framework suggested by Kittlaus and Clough (2009) presents the major functions involved in product management with tasks to participate in or to orchestrate. The tasks are divided into two levels: the corporate level and product (family) levels that are differentiated by the level of authority and strategic impact to the company business. In total, there are nine functions in which the product manager participates: Market Analysis, Product Analysis, Product Strategy,
Product Planning, Development, Marketing, Sales and Distribution, Support and Services. The first two functions (Market Analysis and Product Analysis) are the sources of the raw qualitative and quantitative decision-making data for the product manager. Product Strategy and Product Planning are the business-oriented core functions of product management. The other functions (Development, Marketing, Sales and Distribution, Support and Services) are not directly related to the tasks of the product manager and thus he/she needs to collaborate with the respective departments about decisions concerning these functions.

Another framework has been proposed by Ebert (2009). According to Ebert, software product management provides leadership to activities like portfolio management, strategy definition, product marketing, and product development. These activities are supported by product management processes like portfolio analysis, positioning, strategic planning, product and technology roadmapping, risk management, product definition, and requirements (Ebert, 2009). The processes show the formal content of product management, or at least the activities in which the product manager is heavily involved.

The reference framework for software product management developed by van de Weerd et al. (2006b) defines four main process areas with their inputs and outputs. These process areas with processes are portfolio management, product roadmapping, requirements management, and release planning (van de Weerd et al., 2006a).

Yet another software product management framework has been developed by International Software Product Management Association (ISPMA, 2012). It is based on the frameworks of Kittlaus and Clough (2009), Ebert (2007) and van de Veerd et al. (2006b) and represents a consensus between academic and industrial experts in software product management and integrates three product management frameworks developed earlier (see Appendix A).

Other authors have proposed that such activities as finance (Konig, 2009), defect management (van de Weerd and Katchow, 2009), and software configuration management (Kilpi, 1998) should be taken into account as parts of SPM. Evidently there are many other opinions about the components of software product management (Ebert, 2007; Konig, 2009; van de Weerd et al., 2006a). This indicates that the role of the product manager deserves more attention and clarity.

2.3 Manager roles
We often have a simplistic view that managers organize, coordinate, plan, and control people and activities. Literature, however, contains many examples of different views (Dver, 2003; Mintzberg, 1990; Project Management Institute, 2008). Henry Mintzberg, who has studied a manager’s job extensively, reached the conclusion that management work is contradictory and full of myths (Mintzberg, 1971). The attempts to explain manager roles in terms of competences are useless because “the manager who only communicates or only conceives never gets anything done” (Mintzberg, 1994). To provide a model of what managers really do, Mintzberg (1990) developed a synthesis model consisting of ten manager roles divided into three groups. He defined managers as persons in charge of an organization or a subunit with formal authority and status as obligatory characteristics. Formal authority brings a status, which is a necessary component of various interpersonal relations. These relations and communication are necessary for accessing information in the context of the organization, which includes the prior knowledge of historical, political, and organizational background of the organization. Altogether, relations and information provide the basis for making decisions and developing strategies within an organizational unit. The formal authority gives rise to the first set of
roles called *interpersonal roles*, which in turn give rise to the *informational roles*. These two sets of roles enable the manager to participate in decision making (Mintzberg, 1990). Ten roles have been identified by Mintzberg to capture the manager’s activities during the workday (Table 1).

Table 1. Mintzberg’s management roles (adapted from (Mintzberg, 1971))

<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interpersonal roles</strong></td>
<td></td>
</tr>
<tr>
<td>Figurehead</td>
<td>The manager is a symbol, obliged to perform a number of duties.</td>
</tr>
<tr>
<td>Leader</td>
<td>The manager acts as a leader, pervades all activities, encourages subordinates, and replies to requests.</td>
</tr>
<tr>
<td>Liaison</td>
<td>The manager establishes a network of contacts to bring information to the organization.</td>
</tr>
<tr>
<td><strong>Informational roles</strong></td>
<td></td>
</tr>
<tr>
<td>Nerve Center</td>
<td>The manager has access to all information and each member within the organization. Therefore, the manager accumulates and generalizes information from all members of the organization.</td>
</tr>
<tr>
<td>Disseminator</td>
<td>The manager acts as a transmitter of information to other members.</td>
</tr>
<tr>
<td>Spokesman</td>
<td>This role is similar to the previous one, but the information is transmitted outside the organization.</td>
</tr>
<tr>
<td><strong>Decisional roles</strong></td>
<td></td>
</tr>
<tr>
<td>Entrepreneur</td>
<td>The manager acts as an initiator and designer of all changes and improvements in the organization.</td>
</tr>
<tr>
<td>Disturbance Handler</td>
<td>The manager focuses on corrections, which he or she is forced to make.</td>
</tr>
<tr>
<td>Resource Allocator</td>
<td>The manager is responsible for allocation and control of all resources within the subordinate unit.</td>
</tr>
<tr>
<td>Negotiator</td>
<td>The manager is a participant in negotiation activities in the organization.</td>
</tr>
</tbody>
</table>

Mintzberg’s roles have been the basis for studies devoted to understanding the nature of management positions, such as the position of a CIO (Gottschalk, 2002; Grover et al., 1993). According to these studies, Mintzberg’s roles can be used for describing various management positions at different hierarchical levels in organizations. However, it has been pointed out that Mintzberg’s research methodology has limitations, such as a small sample size, missing reliability checks, and a simplified coding method (Martinko and Gardner, 1990).

Grover et al. (1993) used Mintzberg’s model as the basis of their own survey instrument for investigating the managerial roles of senior-level executives. They identified and studied only six of ten Mintzberg’s roles: leader, liaison, monitor, spokesman, entrepreneur, and resource allocator. The other roles (figurehead, disseminator, disturbance handler, and negotiator) were not identified as separate roles because their activities were related with the activities of the other six roles.

### 2.4 Product manager as a middle manager

The product manager can be seen as an example of a middle manager who acts as a “linking pin” connecting the top management with the lower-level managers (Floyd and Wooldridge, 1992). In this role the product manager acts as an interpreter and implementer of the decisions made by the top management. As a connector between the top and the bottom of the organization, the middle manager has an ability to mediate between strategic and operational levels (Floyd and Wooldridge, 1997). Therefore, his or her understanding of the situation in the organization is more comprehensive compared to that of the top management.
Floyd and Wooldridge (1992) have developed a typology of middle management involvement in strategy consisting of two dimensions: behavioral and cognitive (Figure 1). The behavioral dimension includes upward and downward influence, describing how the middle manager acts in the organizational hierarchy. The cognitive dimension unites integrative and divergent influence. Overall, the typology describes four roles: championing alternatives, facilitating adaptability, synthesizing information, and implementing deliberate strategy (Floyd and Wooldridge, 1992).

<table>
<thead>
<tr>
<th>Behavioral</th>
<th>Upward</th>
<th>Downward</th>
</tr>
</thead>
<tbody>
<tr>
<td>Divergent</td>
<td>Championing alternatives</td>
<td>Facilitating adaptability</td>
</tr>
<tr>
<td>Cognitive</td>
<td>Synthesizing information</td>
<td>Implementing deliberate strategy</td>
</tr>
<tr>
<td>Integrative</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 1. A typology of middle management involvement in strategy (Floyd and Wooldridge, 1992)**

The middle managers have a unique opportunity to collaborate at strategic and operational levels at the same time. It allows them to act in close collaboration with a variety of people representing lower managers, customers, and top managers. The middle managers act as engines in facilitating adaptability (Floyd and Wooldridge, 1994). Without the efforts of middle management, organizational changes meet more resistance (Balogun, 2003). Another role of middle managers is providing synthesized information about external and internal events to the top management. Usually the ideas brought upward to the top management are not strategic proposals but observations and interpretations of events. The function of synthesizing information is integrative, because the middle managers know the strategic directions from the top management and are therefore able to interpret events in the organization within a given frame of strategic perspectives. Implementation of the top management’s strategy is the main role conducted by the middle managers (Floyd and Wooldridge, 1992). It consists of the development of tactical steps to achieve strategic goals. Although this process is considered a mechanical process “where action plans are deduced and carried out from a master strategy conceived by top management” (Floyd and Wooldridge, 1994), the process is more complex due to constant changes in external and internal environments. Therefore, this process can be characterized as a continuous process of fighting with turbulent conditions to achieve the business goals defined by the top management of the organization.

The research of Floyd and Wooldridge (1997) emphasizes that the middle managers' impact on strategy is significant. Their role stays important even when the organizations move away from hierarchical to more horizontal business structures. The study of Floyd and Wooldridge (1997) was used as a basis for the further studies of the role of middle managers. Mantere (2008) has extended the functional view of middle managers by presenting a reciprocal view to their roles. The reciprocal view presents eight factors (narration, contextualization, resource allocation, respect, trust, responsiveness, inclusion, and referring) enabling middle manager’s ability to fulfil the role. These factors altogether are used for evaluation of the impact a particular middle manager has to the strategic initiatives within an
organization (Mantere, 2008). Another study conducted by Balogun (2003) suggests four additional roles of middle managers as change intermediaries (Figure 2). In comparison with the Floyd and Wooldridge (1997) roles, which are mostly focused on the strategic impact of middle managers, Balogun (2006) considers the middle managers as key players in organizational changes.

![Figure 2. Middle managers as change intermediaries (Balogun, 2003)](image)

Overall, the role of a middle manager in an organization is complex. They make a strategic contribution and implement the decisions made by the top management. In addition, the middle managers also perform such tasks as planning, controlling, and budgeting, which are common for all managers, regardless of their level in the organization hierarchy.

In the early 1980s, the role of a product manager was seen as the integrator and coordinator of the production, distribution, and sales processes. Even in this early ages, it was already observed that the product manager’s tasks varied and different job titles could be used to describe product managers as marketing managers, influence agents, or product planning analysts (McDaniel and Gray, 1980). In the survey, McDaniel and Gray (1980) aimed to understand the level of authority and responsibility product managers should have and concluded that “there continues to be concern about the responsibility imbalance, there appears to be little disagreement with respect to various product task and activity area performed by the product manager.” Based on the results, the authors stated that product managers are likely to have a broader scope of responsibilities in the future. However, even three decades later, the product management literature (e.g. (Dver, 2003; Haines, 2008)) is mainly focused on the product managers’ authority and responsibility rather than on other tasks product managers perform. The recent study of product managers in the automotive industry showed the leading role of a product manager in product strategy dissemination and cross-functional team leading (Rauniar et al., 2008).

The role of product manager has evolved since its birth. Initially, it was more or less a marketing or brand manager, but then the tasks related to planning, coordinating, and decision-making started have more emphasis (Buell, 1975). In addition, the concept of the “mini-CEO” was critiqued already in 1975 (Buell, 1975), but this concept still dominates (Condon, 2002; Dver, 2003).
Overall, the previous studies emphasize the leading role of product managers rather than the operating role and functions in orchestrating the product team. While these studies often mention the diversity of tasks and functions a product manager can have, they do not investigate the reasons and variation for the diversity. Acknowledging this research gap, we take into account both leading and operating functions of product managers in order to explain that product manager’s work is not limited to one function only but presents a synthesis of responsibilities along several dimensions. By locating the tasks and functions into different dimensions, we explain theoretically the diversity of roles of product managers in an organization. We focus on the role of software product manager, and present as a result of an in-depth analysis a framework for assessing the roles of software product managers in organizations.

3 RESEARCH METHOD

3.1 Case context and selection
Our research was carried out as a qualitative study using grounded theory as the research method (Strauss and Corbin, 2008). This allowed us to develop the theory inductively. The main instrument in the data collection was interviews with company representatives. In designing the study our critical assumption (Isabella, 1990) was that every software company has product management regardless of its size. Building on this assumption, we designed an inductive study to investigate the product managers’ roles in the companies. The research process we followed is presented in Figure 3.

![Research Process Diagram]

The studied companies ranged in size from 15 to more than 10,000 employees (Table 2) with different business domains, such as banking software, telecommunication solutions, and Internet applications. The interviews were conducted in two rounds (Figure 3) in a period of seven months between February and August 2011. The semi-structured (Charmaz, 2010) interviews were conducted mainly in Moscow and Saint Petersburg (Table 3), but all the companies were international with offices in Russia. Moreover, most of these companies had research and development (R&D) departments in Russia, and only two of them (Company A and L) were represented by marketing and sales offices only. However, the interviewees in these marketing and sales offices were also product managers. We interviewed them in order to understand what product managers do when they are distant from development. During the interviews the representatives of these companies mentioned that they plan to open R&D offices in Russia in the nearest future.

[Figure 3. Research process]
Table 2. Company profiles

<table>
<thead>
<tr>
<th>Company</th>
<th>Business domain, type of product</th>
<th>Size (people)</th>
<th>Founded</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Developer of software products for operational support systems</td>
<td>10,001+</td>
<td>1982</td>
</tr>
<tr>
<td>B</td>
<td>International developer and supplier of a wide range of software products for the marine industry</td>
<td>1,001-5,000</td>
<td>1990</td>
</tr>
<tr>
<td>C</td>
<td>Developer of Internet products and services</td>
<td>1,001-5,000</td>
<td>1997</td>
</tr>
<tr>
<td>D</td>
<td>Developer of security products for users and enterprises</td>
<td>1,001-5,000</td>
<td>1997</td>
</tr>
<tr>
<td>E</td>
<td>Developer of products for storage management</td>
<td>501-1,000</td>
<td>2002</td>
</tr>
<tr>
<td>F</td>
<td>Developer and provider of telecommunication products and solutions, software and hardware</td>
<td>501-1,000</td>
<td>2007</td>
</tr>
<tr>
<td>G</td>
<td>Developer of products for data security and storage management</td>
<td>101-500</td>
<td>1994</td>
</tr>
<tr>
<td>H</td>
<td>Developer and integrator of software products and solutions for small and medium enterprises</td>
<td>101-500</td>
<td>1994</td>
</tr>
<tr>
<td>I</td>
<td>In-house development of software products for internal use</td>
<td>101-500</td>
<td>2000</td>
</tr>
<tr>
<td>J</td>
<td>Developer of software products for software developers</td>
<td>101-500</td>
<td>2000</td>
</tr>
<tr>
<td>K</td>
<td>Developer and provider of the products for interactive media</td>
<td>101-500</td>
<td>2002</td>
</tr>
<tr>
<td>L</td>
<td>Developer of banking software products</td>
<td>101-500</td>
<td>2004</td>
</tr>
<tr>
<td>M</td>
<td>Developer of software products for servers</td>
<td>11-50</td>
<td>2009</td>
</tr>
</tbody>
</table>

Table 3. Roles of the interviewees

<table>
<thead>
<tr>
<th>Interview #</th>
<th>Interview round</th>
<th>Company</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>A</td>
<td>Product manager</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>B</td>
<td>Deputy managing director for R&amp;D</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>C</td>
<td>Product manager</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>C</td>
<td>Product manager</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>D</td>
<td>Product manager</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>E</td>
<td>Product manager</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>F</td>
<td>Department manager</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>G</td>
<td>Product manager</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>H</td>
<td>Deputy director of software development</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>I</td>
<td>Senior business analyst</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>J</td>
<td>Product marketing manager</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>K</td>
<td>Team leader</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>K</td>
<td>Project manager</td>
</tr>
<tr>
<td>14</td>
<td>2</td>
<td>L</td>
<td>Product manager</td>
</tr>
<tr>
<td>15</td>
<td>2</td>
<td>L</td>
<td>Product manager</td>
</tr>
<tr>
<td>16</td>
<td>1</td>
<td>M</td>
<td>Sales director</td>
</tr>
<tr>
<td>17</td>
<td>1</td>
<td>M</td>
<td>Technical director</td>
</tr>
</tbody>
</table>
3.2 Data collection

During the first round we mainly interviewed product managers and people who work with them in close collaboration, e.g. a project manager, a team leader, and a deputy director of software development (Table 3). We analyzed each interview as soon as possible, which helped us to tailor the questions for each following interview based on the experience from the previous ones. This allowed us to increase the quality of the collected material. Our units of analysis (Yin, 2002) were product managers, their tasks and responsibilities. During the analysis of the first round interviews we developed our theoretical understanding (Strauss and Corbin, 2008) about product manager roles. Based on this emerging theory we revised the interview questions for the second round to support or reject it. Therefore, the second round of data collection was directed by emerging concepts (Orlikowski, 1993). In the second round we conducted interviews primarily with product managers because we had already developed theoretical understanding that required checking and, therefore, our questions were clearer and focused more on product management activities. In total, there were eight interviews in the first round and nine in the second (Table 3). The interview questions for both rounds of interviews are available in Appendix B and Appendix C respectively.

The selection of interviewees was guided by our existing contacts, an open call for participation, and snowballing (Strauss and Corbin, 2008), in which the next interviewee was a referral from the previous one. In Companies C and L we interviewed two product managers and in both cases they replied to our open call for participation independently. In the other cases, when we interviewed two persons from the same company, they were referrals from previous interviews. In total the snowballing technique led to three interviews. The interviewees #16 and #17 were the referrals from the interviewee #9, and the interviewee #13 was the referral from #12 (Table 3).

Overall, we concentrated mainly on the middle and top management and preferred interviewees who held the role of a product manager. We asked questions about product strategy, roadmapping, product marketing and decision making processes of all the interviewees, but the questions were tailored for each interview as advised in Charmaz (2010) and Strauss and Corbin (2008). These variations were based on the role of the interviewee and his or her responsibilities, e.g. if an interviewee was not involved in the product marketing activities, we skipped these questions. Therefore, the questions were based on the activities the interviewee was involved but we also asked questions about responsibilities of the colleagues working in close collaboration with the interviewee in order to understand the links between different roles within a particular organization. We also asked additional questions on organizational, hierarchical, and product structure to understand the companies’ context.

The interviews were conducted, recorded, and transcribed in the Russian language, but the coding, analysis and further work was done in English because two of the three researchers were not fluent in Russian. The correspondence and consistency of the terms were established and checked by the first author who is a native Russian speaker. During the transcription process we included as much information as possible by transcribing also non-verbal information such as hesitancies, pauses, and changes in intonation by taking necessary notes inside the transcripts. External events such as interrupted phone calls and small breaks in the interviews were also documented. When possible, face-to-face meetings with the interviewees were conducted, but we also used Skype video and audio interviews. The interviews lasted from 40 to 80 minutes, with an average of 52 minutes. The transcribed text resulted in 214 A4 pages with standard 12pt font and single line spacing. The interview data were complemented with supporting documents. We asked our interviewees if they were able to provide documents written by product managers. As a result, we received eleven documents, 484 pages
in total (Table 4) and coded them separately. In addition, we used publicly available information about the company before the interviews to get a general understanding of their business. After the interview, we briefly reviewed sources such as annual reports, product announcements, and press releases to get additional information related to product management. Using multiple sources of evidence helped us to gain a deeper understanding of the company context and the influence of product managers on the products. This also increased the validity of our results and helped to mitigate the potential for bias of the interviewee's subjective viewpoint to the internal situation in the organization (Yin, 2002). For example, strategies were discussed with almost all interviewees, so it was possible to compare the discussions with the supporting documentations (e.g. Strategy, Table 4) and available product releases in the Internet.

### Table 4. Supporting documentation obtained from the companies for analysis

<table>
<thead>
<tr>
<th>D#</th>
<th>Document title</th>
<th>Organization</th>
<th>Type</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1</td>
<td>Product plan</td>
<td>Organization C</td>
<td>Text document</td>
<td>132 pages</td>
</tr>
<tr>
<td>D2</td>
<td>Product specification</td>
<td>Organization C</td>
<td>Text document</td>
<td>61 pages</td>
</tr>
<tr>
<td>D3</td>
<td>Product vision</td>
<td>Organization C</td>
<td>Text document</td>
<td>35 pages</td>
</tr>
<tr>
<td>D4</td>
<td>Product plan</td>
<td>Organization D</td>
<td>Presentation</td>
<td>17 slides</td>
</tr>
<tr>
<td>D5</td>
<td>Positioning statement</td>
<td>Organization D</td>
<td>Text document</td>
<td>12 pages</td>
</tr>
<tr>
<td>D6</td>
<td>Features and advantages for the Client</td>
<td>Organization D</td>
<td>Text document</td>
<td>7 pages</td>
</tr>
<tr>
<td>D7</td>
<td>Release plan</td>
<td>Organization I</td>
<td>Presentation</td>
<td>6 slides</td>
</tr>
<tr>
<td>D8</td>
<td>Project status</td>
<td>Organization I</td>
<td>Spreadsheet</td>
<td>3 sheets (~13 pages)</td>
</tr>
<tr>
<td>D9</td>
<td>Release plan</td>
<td>Organization I</td>
<td>Spreadsheet</td>
<td>1 sheet (~3 pages)</td>
</tr>
<tr>
<td>D10</td>
<td>Strategy</td>
<td>Organization I</td>
<td>Text document</td>
<td>196 pages</td>
</tr>
<tr>
<td>D11</td>
<td>Application description with technical details</td>
<td>Organization L</td>
<td>Text Document</td>
<td>2 pages</td>
</tr>
<tr>
<td></td>
<td><strong>Total:</strong></td>
<td></td>
<td></td>
<td><strong>~484 pages</strong></td>
</tr>
</tbody>
</table>

### 3.3 Data coding and analysis

The analysis of the collected data was performed using two special tools. The first tool was software for qualitative research, ATLAS.ti (2011), supporting coding in grounded theory data analysis. The second tool CmapTools (Institute for Human and Machine Cognition, 2011) was used for creating concept maps, which are “graphical tools for organizing and representing knowledge” (Novak and Canas, 2008).

In this study we followed the Strauss and Corbin (2008) version of the grounded theory, which relies on a systematic codification and categorization process for observations. In the grounded theory, coding is the fundamental process for analyzing data and generating a theory. There are three basic...
types of coding: open, axial, and selective coding. Open coding is “the interpretive process by which data are broken down analytically” (Corbin and Strauss, 1990). Its purpose is to understand what the data really means, to find the similarities and differences between the pieces of data, and to give a conceptual label to each event/action/phenomenon. Then, the concepts are grouped together to form categories with subcategories, which present a higher level of abstraction than the original data. In axial coding, relationships between categories emerge and they are tested against the data. A single test is not enough to prove or discard a hypothesis; therefore each relationship should be indicated in the data over and over again. If the hypothesis is not supported by new data, it does not mean that the hypothesis is necessarily false, but the context and conditions in which it occurred should be critically evaluated to determine what really happened. Selective coding is a process of defining the core category. The core category shows the central hypothesis of the study. All other categories with subcategories are unified around this core. Strauss and Corbin (2008) suggest identifying the core category by asking the questions: “What is the main analytic idea presented in this research? If my findings are to be conceptualized in a few sentences, what do I say? What does all the action/interaction seem to be about? How can I explain the variation that I see between and among the categories?”

During the Open coding 1 (Figure 3) procedure of the first phase, consisting of eight interviews, we understood that the concepts could be easily grouped using the areas in which a product manager works but it was still unclear how many areas exist. This suggested us a scheme about questions that should be asked from other product managers in the next round. In the second round, we discussed with the product managers mainly about areas in which the product manager worked or collaborated with, and tried to identify new areas of their responsibilities by asking questions about various steps in the product lifecycle. An example of the Open Coding 2 is presented in Table 5. After six interviews in the second round it became obvious that we were no longer able to identify new areas of responsibilities. Our interviewees talked about the same areas, but their focus on each area varied depending on the organization. From these interviews we could not extract new categories in the analysis. We considered this as a sign of theoretical saturation, but to be certain we conducted three more interviews.

Table 5. Example of open coding

<table>
<thead>
<tr>
<th>Interview transcript (translated)</th>
<th>Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Once again... product manager is not a person who decides everything. Yes, he has a power of the final decision making. Nevertheless, a good product manager before creating a product vision generates the ideas for the following product releases. The goal is to create as big list of ideas as possible. By the way, this process of idea generation is a separate process, which is well defined and formalized in marketing. Then, he asks a team leader to evaluate these ideas from the technological viewpoint. I have never seen visions that were totally, 100%, right. Even if the developed vision will be implemented by 90% as it has been written, it is an amazing result. Anyway, a product manager is a person who is fully responsible for the vision development and implementation...” – Product manager, Company C.</td>
<td>product manager as a decision maker, Task: creating a product vision, Marketing function of product manager, collaboration function of product manager, authority and responsibility.</td>
</tr>
</tbody>
</table>

In axial coding, our focus was on the relations between the categories identified at the open coding stage. For example, Task in Table 5 is one of these categories that unites tasks and responsibilities of
product managers. Overall, 47 categories were identified and they narrowed down at the axial coding phase. We compared the categories with each other and established relationships between them. At this stage our observations became more focused on the identification of the core category. At the end of axial coding, we identified four super categories representing the characteristics of a software product manager and explaining his or her role in the organization. These super categories were influence on the product, authority, access to resources, and influence on collaboration.

Our theoretical understanding about the product manager’s roles emerged when analyzing the interview data. Then, using the supporting documentation, we checked how our understanding was supported and reflected in this documentation. For example, we received a product vision as the supporting document primarily developed by the product manager whose quote is presented in Table 5, so we were able to check if a product manager had an impact to the described process of product vision creation in the company as we had interpreted. This was an additional confirmation that the processes in the company were described as they were really implemented. In this case, the product vision was presented in a structured document with all necessary data collected from analysts, developers, and top management. The vision was written in close collaboration with the marketing manager, product analyst, and product delivery professional. It confirms the statement in the quote above that the product manager relied on the inputs from the colleagues and worked in close collaboration with the specialists from other departments. The product vision was described in 35 pages using the structure in Figure 4.

|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

*** is a name for a product line hidden due to confidentiality.

**Figure 4. An example of the product vision table of contents**

From the interview and the product vision document we were able to identify the role of the particular product manager in the company as well as his day-to-day activities. This product manager had a significant *impact on the product* he managed, especially at the *strategic* level. In addition, he had an *influence on collaboration* because he was not relying only on his own expertise but worked in close collaboration with other departments. However, the pattern of the product manager’s *influence on the product* dominated almost all the interviews. *Influence on the product* varied from minor to major.
influence including the full responsibility of the product strategy, vision, and roadmap depending on the organizational and/or political situation in the company. In the analysis influence on the product became a super category with four properties: tactics, strategy, roadmapping, and development (Figure 5), which emerged in the open coding.

In selective coding, the goal was to identify the core category. It can be one of the existing categories or a new category, which has not been identified before because it should be broad enough to cover the central phenomenon under observation (Strauss and Corbin, 2008). In our case, each of the super categories identified during the axial coding explained a part of the theory about the product manager’s responsibilities; therefore the core category should have a broader scope to cover all these super categories to explain the product manager’s responsibilities. We defined the core category as the role of product manager in an organization.

To represent the relationships between the categories we used diagrams, which played an important role in the analysis. Diagrams can be considered as analytical tools that force the researcher to understand the data deeply (Strauss and Corbin, 2008). The early diagrams were quite simple. They helped us to think about possible relationships between the concepts. Later they became more complex: new relationships between concepts arose and each concept got its own properties and dimensions. As a result, the whole picture of the phenomena under observation emerged. The part of the diagram that presents the concept map of the super categories altogether with their properties is shown in Figure 5. The core category the role of product manager in an organization is connected to four super categories, each of them explains a part of the product manager role. For each of the super categories we identified a set of properties, which are “the characteristics that give specificity to and define an object, event, and/or action” (Strauss and Corbin, 2008), connected with the super categories by a link “has property”. These properties describe the super categories from various viewpoints, providing an additional explanation to what is included in the category.
4 THE ESSENTIAL CHARACTERISTICS OF A SOFTWARE PRODUCT MANAGER

In Section 3 we presented the core category and four super categories that emerged during the grounded theory analysis. In this section the four super categories with their properties and dimensions are explained in detail. Each of these categories represents the essential characteristics of a software product manager role, which define his or her areas of responsibilities and boundaries of the role. Based on these findings the Software Product Management Roles Framework (SPMRF) is developed and presented at the end of this section.

4.1 Super categories

4.1.1 Influence on the product

The first super category influence on the product describes the impact of a product manager to the managed product. The following quotations by two product managers show that the first considers himself as a strategy adviser while the second presents himself as a “mini-CEO.”

“Generally speaking, all we do is not mandatory for engineering. It is rather a recommendation than a command. As far as I understand, this is a typical problem of product management in most organizations... The product manager is a person who can influence what happens only by persuasion
and motivation. We cannot say what to do to in engineering, we can only recommend.” – Product manager, Company G.

“The ideal situation is when a product manager is a person who acts as a director of a small enterprise within the company. It should be a small independent company with its own budget and resources. The most important point here is that the responsibility and the authority are not shared between people. This is the worst thing that can happen in a software company, in any company.” – Product manager, Company C.

We observed that product managers in large organizations (Organizations C, D) had more influence on the product than their colleagues from smaller organizations (Organizations E, L). The product managers in large organizations took part in strategic, product, and release planning as we observed from the gathered supporting documentation (D1-D7, Table 4), while their colleagues from smaller organizations could not have so significant impact on the product. In the interviews, they mentioned (Interviews 11, 14, 16, 17) that the top management defines the product strategy and nobody else is allowed to make changes to it. Although we received a strategy document (D10, Table 4) from a relatively small Organization I, this document had been written by a consulting firm instead of product managers within the organization.

As a super category, Influence on the product shows the level of involvement of the product manager to the product tactics, strategy, roadmapping, and development. Participation in development does not mean that the product manager implements the product by herself, but it shows her involvement to product development through project managers and team leaders. In other words, product manager orchestrates the development team rather than directly contribute to their activities.

4.1.2 Authority

The super category authority unites two empirically identified categories of leadership and power of making decisions. The discussions about leadership, authority, and decision making were common for all the interviews. The product managers from the large organizations (Organizations A, C and D) described problems related to their position in the corporate hierarchy. Overall, these problems formed two different problem domains. The first domain included the problems they had in collaboration with other departments including marketing, sales, and development departments. Only one product manager from Organization C had a significant impact on the activities in other departments. Other product managers from all the interviewed organizations could not orchestrate other departments without support from the higher management. Therefore, the ability to orchestrate other departments without intervention from the higher management was assigned to the category leadership. The second domain consisted of the problems related to making strategic and tactical decisions about a particular product without permission from the higher management. In some cases decision making was considered as the main characteristic of a product manager.

“If the product manager is not able to make decisions then he is not a product manager. He can be called a product marketing manager, analyst, or somebody else, but he is not a product manager... You have to have the power to decide, otherwise it is profanation.” – Product manager, Company C.

Together, the categories leadership and power of making decision formed the super category authority. The observations showed that authority was also a characteristic distinguishing technically oriented product managers from business oriented product managers. The product managers with limited authority usually were responsible for technical roadmapping and features prioritization while product
managers who had higher level of authority were usually responsible for making strategic decisions related to the product vision and strategy.

4.1.3 Access to resources
The super category *access to resources* shows which resources, such as product budget and people in subordination, are under the product manager’s responsibility. We also included *information* as a resource, because a product manager can use members of different departments or external consultants as a source of quantitative and qualitative information regarding the market and the product (Kittlaus and Clough, 2009).

“... for example, as a product manager I get an idea about our product but I do not know how many people are interested in that. I go to the analysts and ask them to research the area and determine which features are necessary for our users and how many people are interested in our product. They study it and report the results to me.” – Product manager, Company C.

During the interviews we observed that the access to resources varies depending on the organization but 13 of 17 interviewees claimed that they would prefer to have more resources for managing the product in their hands. The main reason for this wish was difficulties and bureaucratic procedures for getting additional resources. In these cases the product manager must make a request to the higher management every time he or she needs extra resources for the product. In the other 4 of 17 cases interviewees did not mention problems with access to resources but discussed about interpersonal problems inside their teams and about the difficulties to change team members. In some cases, product managers could not ask for additional resources even if it was critical for the product success, because all resources were given by the headquarter office.

“Our headquarter office is engaged in the distribution of budgets and people. I do not have influence on managing resources because our office has no influence on this at all.” – Product manager, Company L.

Overall, the category *access to resources* is an indicator of a product manager’s ability to get resources instantly and plan the product vision and strategy relying on an available pool of resources rather than on the top management decision about their distribution.

4.1.4 Influence on collaboration
The tasks of a product manager include interaction and communication with many stakeholders. However, the involvement and commitment between tasks and organizations vary. We observed cases where the product manager was responsible for the communication function only. He or she was a facilitator between all departments including marketing, development, sales, and support, and was responsible for taking part in solving their problems. His role was to be an intermediate link for the top management level and to solve emerging problems without top management involvement.

“There should be a person who will facilitate the collaboration between the departments within the company. This person should make peace between the financial and sales people. He is responsible for creating and approving sales plans that will address the requirements, as well as for observing what happens in the marketing and R&D departments. The top management expects from this person that people from all these departments stop to come to them and complain that they cannot agree.” – Product manager, Company D.
This quotation shows an extreme case where the product manager worked only as a facilitator without any direct influence on the product. However, during the interviews we also observed less extreme cases where a product manager united orchestration of the departments and direct influence on the products (Interviews 3 and 11). In these cases, they managed a product from its inception to development, marketing, sales, and maintenance phases, which would not be possible without a close collaboration with other departments. For example, we received a product specification (D2, Table 4) written by a product manager in collaboration with the research and development department. The same product manager also provided us a positioning statement (D3, Table 4) for the same product written by him and the marketing department. Based on the document dates, the product plan (D1, Table 4) had been written by the product manager himself based on the previous two documents. This example illustrated us how a product manager can collaborate with other departments in order to create a product plan and subsequently release the product on time and budget.

Generally, the nature of product manager’s work is in collaboration and facilitation of many, if not all, departments in the organization but due to differences in organizational structures of the companies, product manager’s influence on collaboration may be limited.

4.2 Properties and dimensions
The identified categories are characterized by properties and dimensions that define and describe them in detail. A dimension represents the variation of a property along a range. In the qualitative analysis we used a three-level scale for dimensions, which, of course, can be considered arbitrary. However, even this coarse-grained scale provides the practical benefit of differentiating between different possible values of the property and this way it supports detailed analysis of the software product manager role. The identified properties (P) are presented in Table 6 with the super categories (SC) in the first column.

<table>
<thead>
<tr>
<th>Super category (SC) with properties (P)</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low (1)</td>
<td>Medium (2)</td>
</tr>
<tr>
<td><strong>SC1:</strong> Influence on the product (IP):</td>
<td></td>
</tr>
<tr>
<td>- P1.1: orchestration of development</td>
<td>Product manager develops strategy and roadmaps but it is considered as advice only.</td>
</tr>
<tr>
<td>- P1.2: definition of tactical actions</td>
<td></td>
</tr>
<tr>
<td>- P1.3: participation in strategy planning</td>
<td></td>
</tr>
<tr>
<td>- P1.4: creation of roadmaps</td>
<td></td>
</tr>
<tr>
<td><strong>SC2:</strong> Authority (A):</td>
<td></td>
</tr>
<tr>
<td>- P2.1: power of</td>
<td>Product manager is an adviser for other</td>
</tr>
<tr>
<td></td>
<td>Product manager agrees decisions with</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
making decisions
- **P2.2**: product leadership

departments; he can make only minor tactical decisions.

the top management and needs its support in orchestration of other departments.

strategic and tactical decisions in the frame of the developed product and only strategic actions require approval from the top management.

**SC3**: Access to resources (AR):
- **P3.1**: own product budget
- **P3.2**: possibility to hire people
- **P3.3**: information resources

Product manager has no access to resources; all resources are provided by the top management.

Product manager has access to one or two resources only, e.g. he is fully responsible for the product budget.

Product manager has all the resources needed for product development, including product budget and possibility to hire new people.

**SC4**: Influence on collaboration (IC):
- **P4.1**: level of communication
- **P4.2**: ability to resolve problems between departments

Product manager works in isolation from other departments responsible for the product release and does not resolve problems arising between departments.

Product manager communicates with a few other departments and needs a support from the top management to solve the problems arising between departments.

Product manager orchestrates all the people responsible for the product and solves all the problems arising between departments.

The super category *influence on the product (IP)* has four properties (P1.1-P1.4, Table 6) that describe the areas in which the impact on the product is possible, such as strategy planning and roadmapping. Strategic and tactical actions are both important and finding a balanced point between thinking strategically and acting tactically is an issue for many companies:

“We have only an informal product manager. Unfortunately, we don’t have a position for a person who thinks about strategy only. Therefore, our product manager is a specialist in both business and technology. Our strategic initiatives come from me, CEO, or this product manager but we are also responsible for tactical steps, so this balancing point between tactics and strategy is unclear.” – Sales director, Company M.

This leads to the situation where the top management is responsible for strategic actions only. In that case, the product manager acts as an intermediate person who has impact on the strategy and is responsible for tactical decisions. We could not identify any patterns related to strategic and tactical decisions based on our interviews. We observed the situations when product managers were responsible for both strategic and tactical actions in small companies (Organization L) and large companies (Organization C, D). However, we also observed that all strategic decisions might be made without product managers (Organization B). The impact of product managers to development may also be limited due to the importance of research and development department for the high-tech companies.
(Organizations C, D). The scales for measuring the properties P1.1.-P1.4 may be defined as a binary yes/no scale.

The property orchestration of development represents a connection between product management and product development, showing how management and development are coupled together and how actions are synchronized.

The super category authority (A) is characterized by two properties: power of decision making and product leadership (P2.1-P2.2, Table 6). Although the importance of leadership for managers is widely discussed in the literature [43]–[45], in practice, the power of making decisions by product managers may be limited due to the hierarchical and political issues within an organization. In our study, we observed that in the small companies (Organization M and L) all strategic and tactical decisions were made by the top management while product managers were responsible for their implementation only. However, as a company grows, the top management is not able to manage all the products and processes within the organization and therefore these responsibilities are delegated to product managers, who start acting as responsible leaders for the particular product. This situation existed in large organizations (Organization A, C, D, F) while in SMEs the authority of product managers varied from very limited (Organization J) to very powerful (Organization G).

The super category authority (A) was difficult to measure because power of decision making and product leadership rarely have any feasible characteristics to be measured. Therefore, our approach in evaluation of these properties was based on a comparison of different cases, e.g.

“Moreover, a product manager should have power of decision making. Otherwise, he is not a product manager.” – Product manager, Company C.

“No result of our work is obligatory for implementation. We are just doing some research and recommend things, explaining what is wrong and providing solutions on how it should be done. The final decisions are made by the top management or an engineering team.” – Product manager, Company G

We paid attention to the types of decisions that can be made by the product manager without an intervention from the higher management. The situation when product manager is responsible for all tactical and strategic was not observed in the collected data. Therefore, we defined the level of authority as an ability of product managers to make at least tactical decisions regarding the managed product without an intervention from the top management. As a result, we defined the scale for the properties P2.1 and P2.2 as adviser, advocate, and responsible leader.

The third super category, access to resources (AR) is mainly characterized by three properties (own budget, possibility to hire people, and informational resources) that show the amount of resources available to the product manager.

“From the process viewpoint, I had difficulties with resource management. It was a problem for our company because I, as a product manager, could not ask as many resources as necessary for my product. Moreover, I could not be sure that these resources would not be asked to return back to the resource pool for another product. Therefore, even if I had people working on the product this week, it did not mean that they were working for the same product next week. The top management could redistribute any resources including people and budget at any time.” – Product manager, Company D.
The super category *access to resources* (AR) has three properties (P3.1-P3.3, Table 6). The first two properties include possibility to hire people and own budget for the developed product (P3.1 and P3.2, Table 6). It shows if the product manager has all the resources needed for creating and running the product or whether he or she asks for additional resources from higher management when needed. Therefore, these two properties have a binary *yes/no* scale. The resource management was especially a problem for medium-size companies, where product managers had very limited access to any resources (Organization I, J, K). Moreover, they claimed about difficulties in requesting additional resources from the top management. In the small and large companies the situation with resources was better. In the large companies (Organization B, D) there was a pool of additional resources from where product managers could take more resources in case of their critical importance to the product success. In the small company (Organization M) due to its flexibility resources could be redistributed at any phase of product development. The third property (P3.3.) includes information resources that are considered as sources of valuable information for a product manager. For example, the product manager may request a market analysis either from the marketing department or from internal or external consultants or analysts. In this case, they can be seen as resources from the product manager point of view. Based on the interviews, we identified three possible values for the property: *no information resources, only internal information resources, both internal and external information resources*.

The fourth super category, *influence on collaboration* (IC) is described by two properties: *level of communication* (P4.1, Table 6) with other departments, and *ability to resolve problems between departments* (P4.2, Table 6). The category describes two sides of the work of a product manager. First, the product manager acts as general caretaker delegated by the top management to manage the issues within the organization. Second, it shows the involvement of the product manager in the collective process of creating the product.

“In my work I work in close collaboration with our offices worldwide. Since our product is international, it is almost impossible to solve all the problems in our office only. Therefore, I spend a lot of time talking with our colleagues in other offices to facilitate them and make decisions together in alliance with the corporate strategy.” – Product manager, Company L.

The scales for these properties have also been established based on comparison of different patterns observed during the interviews. However, these patterns were unspecific to a company size or any other company characteristic. We have seen product managers who collaborate and resolve problems in very different companies, e.g. Organization L and A, but we also talked with people who worked in isolation from other departments, e.g. Organization E and J.

As a result, we defined a scale for the property *level of communication* as *isolation*, when a product manager works in isolation from other departments, *introversion*, when a product manager collaborates with a few departments only, and *extroversion*, when a product manager works in close collaboration with almost all the departments that have an impact on the managed product. The scale for the second property *ability to resolve problems between departments* (P4.2, Table 6) consists of three points as well: *no*, meaning that a product manager does not resolve any problems between departments, *facilitator*, meaning that a product manager needs to have a support from the higher management in order to resolve problems, and *orchestrator*, meaning that a product manager resolves independently most of the problems between departments.

Table 7 presents all the described properties with scales.
Table 7. Framework properties with scales

<table>
<thead>
<tr>
<th>Property code</th>
<th>Property description</th>
<th>Scales with points</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1.1</td>
<td>Orchestration of development</td>
<td>No (0)-Yes (1)</td>
</tr>
<tr>
<td>P1.2</td>
<td>Definition of tactical actions</td>
<td>No (0)-Yes (1)</td>
</tr>
<tr>
<td>P1.3</td>
<td>Participation in strategy planning</td>
<td>No (0)-Yes (1)</td>
</tr>
<tr>
<td>P1.4</td>
<td>Creation of roadmaps</td>
<td>No (0)-Yes (1)</td>
</tr>
<tr>
<td>P2.1</td>
<td>Power of making decisions</td>
<td>Adviser (0)-Advocate (1)-Responsible leader (2)</td>
</tr>
<tr>
<td>P2.2</td>
<td>Product leadership</td>
<td>Adviser (0)-Advocate (1)-Responsible leader (2)</td>
</tr>
<tr>
<td>P3.1</td>
<td>Own product budget</td>
<td>No (0)-Yes (1)</td>
</tr>
<tr>
<td>P3.2</td>
<td>Possibility to hire people</td>
<td>No (0)-Yes (1)</td>
</tr>
<tr>
<td>P3.3</td>
<td>Information resources</td>
<td>No (0)-Only internal (1)-Internal and External (2)</td>
</tr>
<tr>
<td>P4.1</td>
<td>Level of communication</td>
<td>Isolation (0)-Introversion (1)-Extroversion (2)</td>
</tr>
<tr>
<td>P4.2</td>
<td>Ability to resolve problems between departments</td>
<td>No (0)-Facilitator (1)-Orchestrator (2)</td>
</tr>
</tbody>
</table>

Based on the comparison of the collected data with the properties and dimensions, we defined an indicative three-level scale for each category: low (1), medium (2), and high (3). The description of each level is presented in Table 6. The descriptions of each level in Table 6 are based on the patterns identified in the analysis. These qualitative descriptions may be used for the evaluation of product manager profiles only if the pattern descriptions are very similar to the evaluated profiles. To make this procedure more explicit and independent from the already observed patterns, we used scales for each property (Table 7) and assigned numeric values to these scales. Therefore, each super category can be measured based on its properties with scales. The scores in Table 8 are defined by matching the patterns in Table 6 and comparing and evaluating the scales with the patterns in the data.

Table 8. Scores for measuring super categories along scales

<table>
<thead>
<tr>
<th>Super categories</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low (1)</td>
</tr>
<tr>
<td>SC1: Influence on the product (IP)</td>
<td>0-1</td>
</tr>
<tr>
<td>SC2: Authority (A)</td>
<td>0</td>
</tr>
<tr>
<td>SC3: Access to resources (AR)</td>
<td>0</td>
</tr>
<tr>
<td>SC4: Influence on collaboration (IC)</td>
<td>0</td>
</tr>
</tbody>
</table>

Then, to present the role of the product manager in different companies graphically, we used polar charts with four dimensions corresponding to the categories and the three levels (Figure 6). In the next section we will show how the Software Product Management Roles Framework (SPMRF) was used for identifying the product manager roles in the organizations.
5 Stereotypical Profiles

As mentioned in Section 4.2, we used dimensions to evaluate the variation of the super categories' properties along ranges. We developed these dimensions by finding the similarities and differences between the roles and actions of the product managers. In the second round of analysis, we traced back to the initial categories to identify what dimensions were specific for the particular product manager. In total, we evaluated eight software product managers (Interviews 1, 3-6, 8, 14, 15) and one product marketing manager (Interview 11) with SPMRF and identified four profiles for software product managers that repeated in the data (Figure 7). The results of this evaluation are presented in Table 9. In the last row of this table, we present the sources of evidence that were used in the evaluation. These sources consist of interviews, but we also used the supporting documentation when it was available.

Table 9. The product managers’ evaluation with the SPMRF framework

<table>
<thead>
<tr>
<th>Super category</th>
<th>Roles of the interviewees</th>
<th>Sources of evidence (I – interview, D – supporting document)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC1 (IP)</td>
<td>PM1: 1, PM2: 3, PM3: 3, PM4: 3, PM5: 1, PM6: 3, PM7: 1, PM8: 1, PMM9: 3</td>
<td>I1, I3, I4, D1, D2, D3</td>
</tr>
<tr>
<td>SC2 (A)</td>
<td>PM1: 3, PM2: 3, PM3: 2, PM4: 3, PM5: 1, PM6: 2, PM7: 3, PM8: 3, PMM9: 3</td>
<td>I1, I3, I4, D1, D2, D3</td>
</tr>
<tr>
<td>SC3 (AR)</td>
<td>PM1: 1, PM2: 2, PM3: 1, PM4: 2, PM5: 1, PM6: 1, PM7: 1, PM8: 1, PMM9: 2</td>
<td>I1, I3, I4, D1, D2, D3</td>
</tr>
<tr>
<td>SC4 (IC)</td>
<td>PM1: 3, PM2: 1, PM3: 1, PM4: 1, PM5: 1, PM6: 1, PM7: 3, PM8: 3, PMM9: 1</td>
<td>I1, I3, I4, D1, D2, D3</td>
</tr>
</tbody>
</table>

Figure 6. Software Product Management Roles Framework (SPMRF) (IP = Influence on the Product, A = Authority, AR = Access to Resources, IC = Influence on Collaboration)
The first profile, named *Expert* (Figure 7, a), has low levels of properties in all dimensions. The *Expert* is a person who has deep expertise in any area of business or development, but has little responsibility over product management activities. Good examples of this profile are junior product managers who come from specific fields such as engineering, marketing, or sales. Sometimes *Experts* represent the engineering side of product development, and other activities are built around these experts.

“There is an informal product manager because we do not have this position in our company. He is a highly qualified expert who develops, tests, and supports our solutions. He understands these systems deeply at the technological level because neither I nor my colleagues have expertise in this area... Therefore, all technological ideas come from him. He acts as an undisputed guru. If he thinks that some features are really important for our product, then we build the business around them creating the right structure.” – Sales Director, Company M.

The *Experts* hold a position in which the success of the product depends on their expertise and on understanding which features should be implemented. They act as product leaders even if they participate only in the implementation, avoiding other areas of responsibilities such as product analysis,
requirements elicitation, roadmapping, and strategy definition specific for the role of the product manager. This type of product manager was observed in Organization E. The company had not enough resources to hire many people, so cross-functional roles were common. Moreover, the company paid attention to its technological know-how, and therefore a technical leader became a product manager who paid attention to product development and positioning but, in reality, had no direct impact on the product. Only a few people in the organization knew the full picture of their business, and the role of the product manager was limited to some minor details. We called also this group of product managers Experts because of their high qualifications in what they do, even if they participate only in one of the many activities common for product managers.

The second profile, named Strategist (Figure 7, b) describes a product manager who actively participates in strategic and tactical planning of the product development and has enough power and authority to bring real impact to the strategy. This means that the roadmap and vision suggested by him or her are usually accepted by the higher management with minor changes.

“I make decisions regarding the product: what it should look like, which features will be implemented and how it will be positioned in the market segments.” – Product manager, Company C.

“I make propositions of the vision and our strategy for the next year. Then, these documents are defended in the front of the top management board and necessary changes are introduced. After that, the strategy is ready for implementation.” – Product manager, Company G.

The Strategist profile was observed in the large and medium sized companies (Table 2, Organizations C and G) that had a separate product management department. The responsibilities and hierarchy in the department depended on the maturity of the product management. In the simplest case, product management was represented by a small group of people who were responsible for communicating with customers, defining strategy and vision, and planning features for the next releases. In these companies product management was also tightly coupled with marketing. Therefore, a Strategist can be responsible for the product strategy as well as the marketing strategy. As the company grows, marketing is separated into another department. Then, a hierarchy in the product management department may appear along with the role of a vice president of product management. The organizational changes may be associated with an increased role of the product management department to product strategy and its implementation. The influence of the top management on the product may decrease because it is delegated to the product management.

The third profile, named Leader (Figure 7, c) can be characterized with a medium level of access to resources and with a high level of authority and influence on the product. The Leader profile is the next step in the evolution of the Strategist. When a strategist shows his or her influence on the success of the product by providing a strategic vision to the existing situation, his or her authority grows and he or she gains access to resources from the higher management. As a result, he or she becomes the leader of the product but is still controlled by the top management. This is a step towards becoming the product “mini-CEO.”

“I define the product strategy which is matched with our vision and customers' requirements. I am also the curator of resource allocation. I allocate resources to product development and to the implementation of the requirements for this product.” – Product manager, Company C.

The Leader is balanced in his or her responsibilities because the Leader has a possibility to influence the product resources for the strategy implementation. Only the influence on collaboration is limited.
This implies that the Leader concentrates in his or her work without the involvement of other departments in product development.

The fourth observed profile we named the Problem solver (Figure 7, d). In general, the influence of this role to actual product management and development can be quite limited.

“My task is to work as a lubricant for all the processes and departments involved in the product development so that these people know and understand the situation. I do not participate in the strategy definition because it is what comes from geeks and they do it.” – Product manager, Company A.

A product manager of the Problem solver type is a negotiator between many people who represent marketing, development, sales, support, and higher management. The problem solver acts as a manager who solves arising product-related issues while the top management does the product strategy and roadmapping. The main thing here is that the Problem solver has good communication skills and authority in problem areas, which leads to an ability to build effective collaboration between the product stakeholders.

6 DISCUSSION

The outcome of the study is the Software Product Management Roles Framework (SPMRF) for identification and description of software product manager’s role in an organization. We illustrated the use of the framework in the studied organizations and identified four stereotypical role profiles of software product managers. The framework was developed empirically based on the in-depth interviews with the companies’ representatives and investigation of the supporting documentation. The SPMRF assesses product managers along four dimensions with a three-level scale. In this section we discuss the two research questions formulated in the beginning of the study. Then, we compare post factum the developed framework with ten management roles of Mintzberg (1971) and discuss the orthogonality of the framework axes. After that, the implications of the study are described and followed by the discussion of generalizability of the study.

6.1 The roles of software product managers in organizations

In the product management literature, for example (Dver, 2003; Gorchels, 2000), product manager is often described as the product “mini-CEO”. In the SPMRF, the “mini-CEO” profile looks like a profile with the highest levels in all four dimensions (Figure 9).
This profile would mean that a product manager has a possibility to make strategic and tactical decisions as well as implement tactical actions to create a successful product, has all resources in his or her hands to manage them in alliance with the product vision, has a power for making decisions related to the product, and collaborates with all other departments responsible for the product. In our data, none of the profiles had the highest value in all of the four dimensions: influence on the product (IP), authority (A), access to resource (AR), and influence on collaboration (IC), which may be explained with the reluctance of the top management to delegate its own authority (Ugboro and Obeng, 2000). However, this profile may be easily extracted from the existing descriptions of the “mini-CEO” role in the literature.

Low levels in the dimensions are related to the cross-functional and multitasking nature of the role of the product manager, which leads to taking responsibility of many things at a time. The existing software product management frameworks (Ebert, 2007; Kittlaus and Clough, 2009; van de Weerd et al., 2006a) describe many product activities in which product manager is involved. In practice, these activities are not the responsibility of one product manager only but of several managers or even a separate product management department. Therefore, a typical product manager focuses on a limited set of functions defining his or her profile.

In our cases product managers had not started their career in product management but came to product management from adjacent disciplines. These disciplines varied from purely technical such as software development and system analysis to business related such as sales management and marketing management. When discussing about the first steps in the field of product management they all mentioned that they started as Experts in the field they were working before. Technical specialists started as Experts in the technologies, because they could explain and evaluate how the customers’ needs can be satisfied with the existing codebase. Business related specialists started as specialists in elicitation of product requirements and selection of features. The marketing specialists also had previous experience of product marketing.

The stereotypical profile of Strategist fits well with the core product management activities in the Software Product Management Framework (Kittlaus and Clough, 2009). As a person who has an
impact on the developed product, his or her main responsibilities were related to positioning, roadmapping, requirements managing, and release planning. Since the impact on collaboration and access to resources for Strategist is limited, all the plans and propositions may be fully delegated to other departments such as research and development by the top management only. In this regard, Strategist has no people in direct subordination and reports to the higher management only.

The stereotypical profile of Leader, in comparison with Strategist, has access to resources and a high-level of authority to make all tactical and sometimes strategic decisions. Therefore, Leader is not only responsible for the product vision and strategy but also takes part in their implementation. Leader is involved in the same activities as Strategist but is also responsible for resource allocation. This allows Leader to be more flexible than Strategist in making decisions and planning the product features and releases.

In comparison with project managers who have resources for project implementation, we found that product managers often have a limited access to resources. Without resources, product managers cannot act as product leaders and their role may become restricted to giving recommendations to the higher management and project managers who have the necessary resources for development.

The stereotypical profile of Problem Solver is neither extension nor evolution of the previous profiles but another profile of a product manager in the company. Problem Solver’s impact on the product is limited as well as access to resources. In this regard this profile is similar to Expert but the profile has the same level of authority as Leader in addition to the level of impact on collaboration, which was not observed in any other profile. Altogether, these two characteristics make a product manager a good Problem Solver. The product manager of this type is able to effectively organize and orchestrate all the departments involved in the product development. Even more important is that this type of product manager is able to resolve conflicts arising between the departments in order to make their collaboration more effective and reducing time-to-market. Kittlaus & Clough’s framework (Kittlaus and Clough, 2009) makes a distinction between activities in which the product manager is involved and activities he or she orchestrates. The involvement of Problem Solver in any activity may be sporadic, but the orchestration is the main part of his or her work.

The product manager’s responsibilities seem to depend on the particular organizational structure and the top management. They define whether a product management department exists and how it is organized. The organizational structure is a result of the company history and culture. It defines the values and conceptions of the top management, as well as their responsibilities and the decisions they are ready to delegate to product managers (Christensen and Overdorf, 2000).

Some of the studied companies had started as technological startups. In these companies product management may appear later and without a readily available understanding of its role in the organization. As the company grows, the top management may not able to solve all the daily product-related technical and business problems. To reduce their workload, the top management hires one or several persons who will be responsible for the activities related to product management and development. Unfortunately the top management may not yet be ready to delegate the strategic decisions. In these cases the product manager often acts as a Problem Solver or Expert without the power of making strategic or tactical decisions related to the product. However, we also observed companies that were established by two persons who separated business and technical parts from the beginning and acted as the Chief Executive Officer (CEO) and Chief Technology Officer (CTO), respectively. In these companies, product management existed from the beginning.
Overall, the product manager’s work as well as other managers’ work is dynamic rather than static (Haines, 2008). The identified four stereotypical profiles altogether with empirical observations of the differences in adoption of software product management practices in SMEs and large enterprises (Maglyas et al., 2012a) show how a product manager’s role may evolve from Expert to Strategist or Problem Solver and from Strategist to Leader by extending product management responsibilities. The next steps in the evolution of a product manager’s role might be the profile of mini-CEO but we have not observed it in practice yet. The profile of mini-CEO attracted our attention mainly because it is widely discussed and described in the product management literature.

In this study we have identified the roles of software product managers using the grounded theory as the research method. The research method allowed us to conduct the study inductively without any predetermined theories. The companies in our study produced software-intensive products and we observed that the knowledge of the software domain is embedded into the Expert profile. The other three profiles can be seen as evolution of the Expert profile and therefore the knowledge of the software domain is also inherited by Strategist, Problem Solver, and Leader. However, we observed that the specific skills and knowledge are often acquired in advance before entering a job of a product manager. Therefore, the knowledge of the software domain is not specifically reflected on the framework, which may be suitable not only for the software domain but for other domains as well.

6.2 Management roles
We developed the SPMRF empirically and inductively using the grounded theory approach. This kind of an inductive approach requires that the analysis should not be based on any particular background theory. Therefore, we did not try to fit our theory to any existing frameworks, such as the ten managerial roles developed by Mintzberg (1971). As the framework was developed, we compared it with other frameworks post factum. Overall, our SPMRF differs significantly from Mintzberg’s typology. First, Mintzberg (1971) assumed that power and authority is something that is embedded in the very nature of manager work. In our framework, we extracted authority only as one of the dimensions because we observed a lack of authority in some cases. In this regard, it is possible that a product manager has no people in subordination. Therefore, authority and leadership are not that important for all product managers as for managers that need to manage people. In total, Mintzberg (1990) identified three interpersonal and three information roles. Based on our data we could differentiate many roles, and thus the dimension influence on collaboration (IC) is a synthesis of six roles. It seems that product managers act as communicators and collectors of information without significant differences between the external and internal sources of information and the persons they communicate with. Product managers concentrate on the essence of their product and its improvement. The Mintzberg (1971) “resource allocator” role fits well with our dimension access to resources (AR), but we additionally established three levels of it. This role is described as a decisional role by Mintzberg (1971), but in SPMRF it is a separate dimension because some product managers had only a limited access to resources. The SPMRF dimension impact on the product has no counterpart in Mintzberg’s roles. We may consider this dimension as a synthesis of three decisional roles, but it also includes some special properties, such as strategic, tactical and roadmapping issues which are not described by Mintzberg, who talks about improvements and changes only (Mintzberg, 1971). Overall, Mintzberg’s roles can be seen in the dimensions of SPMRF. Our profiles describe the synthesis of roles performed by product managers. Mintzberg’s roles lack this synthesis because he considered a real manager as a mix of the described ten roles, but did not present role profiles for managers (Mintzberg, 1990).
When comparing our stereotypical profiles with the typology of middle management involvement in strategy developed by Floyd and Wooldridge (1992), we found that the involvement in strategy at the corporate level is characteristic to two profiles only: Strategist and Leader. The other two profiles (Expert and Problem solver) do not participate in strategic management and, therefore, have low impact to the product strategy. Their role is described well by Balogun (2003). They act as change intermediaries who keep the business going by implementing the strategy and changes made by the higher management.

Our stereotypical profiles fit partially to Mintzberg’s framework (1971) and to other product management frameworks (Ebert, 2009; Kittlaus and Clough, 2009; van de Weerd et al., 2006a) because these frameworks represent a synthesis of the activities of all managers. In practice, the activities of managers in general and product managers in particular are limited, due to political issues or available work time and other resources. In our study we observed that the product managers are so busy that they are not able to participate in all the activities they should according to the existing frameworks. Therefore, some of them concentrate on strategic activities while others are involved in solving everyday problems. This focus on some activities only is reflected in our profiles, which present how a particular product manager may focus, rather than what all product managers do.

6.3 Framework axes’ orthogonality
An important question for applicability of the framework in practice is the orthogonality of its axes, or independence of score changes in one axis from other axes. The current study was an interpretive qualitative study with the goal to identify product manager profiles rather than create a statistically confirmed model for the framework. Therefore, we cannot fully determine if axes are orthogonal. However, even the four identified profiles can provide an insight on this topic. We analyzed variations between the axes by fixing one axis and observing how the values of other axes may vary. The results of this analysis are presented in Table 10.

Table 10. Variations in values of different axes if one axis is fixed

<table>
<thead>
<tr>
<th></th>
<th>SC1</th>
<th></th>
<th>SC2</th>
<th></th>
<th>SC3</th>
<th></th>
<th>SC4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
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<tr>
<td>SC1</td>
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<td>SC4</td>
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</tbody>
</table>

Rows in Table 10 present a fixed super category with particular score, columns show what scores correspond to the fixed score. For example, when the super category Authority (SC2) has the highest value three (3), other super categories can have different values, e.g. SC1 can be either 1 or 3, SC3 can be 1 or 2, and SC4 can be either 1 or 3. In this regard, we can consider the super category SC2 independent from other super categories. Similarly, when the super category Access to resources (SC3) has the lowest score 1, the super category Authority (SC2) can have any score from 1 to 3. However,
we do not have a complete value set for some super categories, e.g. SC1 with the score 2, SC3 with the score 3, and SC4 with the score 2. In addition, for some super categories, e.g. SC2 with the score 1, we have fixed scores in other axes. This may mean certain dependence between axes or it can also be explained by missing profiles that have not been observed in practice yet. In spite of these missing values Table 10 suggests that the axes are to some degree independent. Overall, the question about the orthogonality of the axes requires an additional quantitative study, where more precise scales are developed and tested.

6.4 Theoretical and practical implications

The main theoretical implication of the study is the framework for assessing and evaluating the tasks of software product managers. The framework decomposes the product manager role thoroughly described in the product management literature, the “mini-CEO”, into four stereotypical product manager profiles, an expert, strategist, leader, and problem solver.

In comparison with other studies of the management roles, like Mintzberg’s (1971) ten roles, that are mainly descriptive, our approach is also predictive. Developing a frameworks allowed us both to find four stereotypical product manager profiles and also to predict that other profiles can exist.

The studies on the role of product managers have often claimed that product managers can have different job titles (e.g. (Buell, 1975; McDaniel and Gray, 1980)). However, these studies do not explain why this difference exists. The SPMRF framework explains the nature of this difference using the levels of involvement of the product managers into the activities along the four dimensions. For example, having the highest level of IP while the other three levels remain low would mean that the product manager is heavily involved into strategic and tactical planning of the product and therefore can be called a product planner rather than a product manager. Similarly, the highest level of IC with the other three levels remaining low describes a coordinator role.

The results of this study have implications for top management, product managers, and researchers. The three-level scale for each dimension allows software product managers to assess their own positions in the company making their role more transparent and clarifying the nature of software product manager’s work.

The four stereotypical profiles make it easier for the top management to assign responsibilities and control their execution according to the profile of a particular software product manager. The profiles may also be used to limit the number of activities in which the product manager is involved. In addition, the profiles may reduce overlapping activities between product managers and help to organize the product management department more effectively by separating the functions of many product managers. In case of a lack of a particular profile in a company, the developed profiles allow the human resources (HR) managers and top managers to identify the necessary skills required for the product manager depending on the role he or she has in the company.

Finally, the results have implications for product management education and further studies. The stereotypical profiles emphasize different activities in which product manager is involved. Therefore, a particular profile requires concentration on the set of skills that vary from one profile to another. Taking into account that different product management frameworks include up to 48 activities (ISPMA, 2012; Kittlaus and Clough, 2009; Pragmatic Marketing, 2010b), limiting the skill set necessary for a product manager of a particular type lowers the entry barrier to the position. From the research perspective, further investigation of other possible stereotypical profiles is necessary.
Theoretically, the framework describes 81 product manager’s profiles but we have observed only four of them so far. The three-level scale developed during the qualitative analysis is only indicative and therefore it should be a subject for further research. Finally, the present study does not exclude the existence of other profiles.

6.5 Generalizability of the results
The generalizability of the grounded theory in general and our research in particular is based on the increasing level of abstraction from open to axial coding, and then to selective coding. The more abstract the concepts, the wider the scope of the developed theory. At the same time, the theory is based on collected data, so it may not be fully applied in “not-quite-the-same situations” (Corbin and Strauss, 1990). In our study, the companies represent businesses in various domains from banking software to telecommunication solutions. Therefore, the identified profiles are independent of the business domain. In this regard, the results and the profiles may be usable regardless of the business domain.

Our results have a territorial bias because we conducted the interviews in Russia only. However, all the studied companies are international. The headquarters of six companies are situated in the USA and Europe and the Russian branches included research and development offices. The other companies are originally Russian, but also their activities are international. The study shows that the company size plays an important role in how the software product manager role is established. This has an effect on the generalizability of our results because this factor cannot be avoided (Lee and Baskerville, 2003).

The interpretations of the collected data are a source of researcher’s bias to the findings. This bias is common to all qualitative studies but we tried to tackle this bias by using triangulation of various sources of data such as interviews and supporting documentation to verify our theoretical understanding and draw the conclusions based on the solid evidence from the data. We conducted three more interviews to determine the saturation of our findings and no new categories emerged from these three additional interviews. We also developed our theoretical understanding based on the emerged categories as soon as possible after the interviews. This allowed us to verify our understanding and interpretations several times in the further interviews. Based on the set of saturated data, we developed the SPMRF. However, its verification and further development of scales require additional investigation.

Strauss and Corbin (2008) state that by using the grounded theory approach we create a theory, which is dynamic rather than static and can be extended by adding new data. Therefore, we could reveal more details by increasing the number of studied companies. It may happen that in the future we find new roles in addition to the identified four. Theoretically the number of roles is 81, but currently we have no evidence of other roles except the four described. The grounded theory tends to provide credible results, because it is based on the method of constant comparison in which categories and concepts emerge repeatedly and guide the continuous research (Glaser and Strauss, 1967), resulting in an inductive theory. In this regard, credibility is embedded in the grounded theory approach.

7 Conclusion
In this study we provided an empirical insight into the role of product managers in software business. Throughout the study we searched answers to the questions of what roles of software product managers exist and how these roles are interrelated with the organizational structure and each other. The role of a
product manager is especially important in the competitive market of software products, where most features can be easily reproduced and improved by competitors (Christensen and Overdorf, 2000).

The SPMRF provides an instrument for profiling of product managers. It allows product managers and top management to understand the tasks held by product managers. It helps to avoid the situation where the top management and the product manager have a different understanding and expectations about the responsibilities of the product manager. Our four identified profiles fill this gap by providing descriptions of variations in the responsibilities and by giving a tool for assigning responsibilities for a particular product manager. The framework is useful for companies with a separate product management department because it shows how the roles can be separated within the department between many product managers, so that each of them has clear responsibilities for their own part of product management.

The “mini-CEO” concept has initially been described in the product management literature as the product manager role (Dver, 2003; Ebert, 2007). This may have biased practitioners’ understanding of what product managers really do. In practice, product managers have sometimes difficulties to explain what they are responsible for. The explanations may include descriptions like “he does everything the product needs to be successful” (Maglyas et al., 2012b). This study revealed that the product manager role may vary from Experts to “mini-CEOs” creating a multitude of different roles a particular product manager can have within an organization. The developed framework and identified stereotypical profiles explain the variation in product manager’s work. Moreover, the product manager’s role has a tendency to evolve within a company. It is especially important for the companies that have a separate product management department where several product managers are responsible for one product. Taking into account four stereotypical profiles, their tasks may be easily shared. Expert, who may be known as technical product manager, provides the technical or marketing expertise to the developed product. Strategist is responsible for the vision and strategy of the developed product, whose main goal is to collect the necessary information to support the vision and the strategy with quantitative and qualitative data. Strategist works in close collaboration with Leader who is responsible for strategy and vision implementation altogether with marketing, sales, and engineering departments and has an impact to the strategy planning as well. Problem solver facilitates interactions between the departments and resolves the collaboration and communication problems arising between the departments.

According to Mintzberg “managerial work does vary, according to the needs of a particular job and the approach of its particular incumbent” (Mintzberg, 1994). Nevertheless, an understanding of which roles exist, how product manager perform these roles, and what relationships between the roles exist is critical for definition of organizational structure (Mintzberg, 1994). Moreover, “being labeled or treated as a product CEO can be a daunting situation, since it nearly always means operating without the authority and resources available to a corporate CEO” (Steinhardt, 2010). Therefore, this study provides practitioners and researchers with an understanding that product manager is not limited to a product “mini-CEO” but he or she may as well act as Expert, Strategist, Leader, or Problem Solver.

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REFERENCES
http://cmap.ihmc.us/.


Appendix A. ISPMA SPM Framework

<table>
<thead>
<tr>
<th>Strategic management</th>
<th>Product Strategy</th>
<th>Product Planning</th>
<th>Development</th>
<th>Marketing</th>
<th>Sales and Distribution</th>
<th>Service and Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corporate Strategy</td>
<td>Positioning and Product Definition</td>
<td>Product Lifecycle Management</td>
<td>Engineering Management</td>
<td>Marketing Planning</td>
<td>Sales Planning</td>
<td>Service Planning and Preparation</td>
</tr>
<tr>
<td>Portfolio Management</td>
<td>Delivery Model and Service Strategy</td>
<td>Roadmapping</td>
<td>Project Management</td>
<td>Customer Analysis</td>
<td>Channel Preparation</td>
<td>Service Provisioning</td>
</tr>
<tr>
<td>Market Analysis</td>
<td>Pricing</td>
<td></td>
<td></td>
<td>Product Launches</td>
<td>Operational Distribution</td>
<td>Sales Support</td>
</tr>
<tr>
<td>Product Analysis</td>
<td>Ecosystem Management</td>
<td>Legal and IPR Management</td>
<td>Performance and Risk Management</td>
<td>Operational Marketing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participation</td>
<td>Core SPM</td>
<td></td>
<td></td>
<td>Orchestration</td>
<td></td>
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</tbody>
</table>

Figure 10. ISPMA SPM Framework V1.1

Appendix B. The interview questions for the first round

General questions and company context
- General information about an interviewee (name, company, e-mail address, phone number, position, experience)
- General information about a company (name, number of people, number of IT people, work area, goals)
- Could you describe the management hierarchy of the company?
- Could you describe the responsibilities at the each level of hierarchy?

Software Product Management components
- How do you manage your products? Do you have a product management function?
- How do you do the following things (briefly)?
  1. If you do not do something, briefly describe why
2. Who is responsible for each activity?
3. What is the role of … for managing the product?
   • software configuration management
   • defect management
   • strategy definition
   • portfolio management
   • product marketing
   • product development
   • product requirements
   • release planning
   • project management
   • finance (pricing)

Is there anything else that is related to the managing of the product?

**Software Product Management discussion and conclusion**
- What, if anything, do you know about software product management?
- Could you briefly describe the established process of managing the product? Are you satisfied? In your opinion, what should be changed? Are you familiar with the term “SPM”?
- Is there anything else you think I should know to understand the company better?
- Is there anything you would like to ask me?

**Appendix C. The interview questions for the second round**

**General questions about software product management**
- Have you ever heard about software product management?
- Could you explain how you understand the term software product management?
- What experience do you have regarding the application of software product management methods?
- What is the role of software product management in your organization?
- How does your business orientation affect software product management?

**Product manager’s role**
- How is your work related to software product management?
- What is the role of product manager in your organization?
- Do product managers in the organization have access to the resources? How do they manage these resources?
- Could you describe the decision-making process in your organization?
- Who in your organization defines the strategy? Business goals? In your opinion, how much do policies or management affect these decisions?

**The main components of software product management**
- Do you have a strategy department? If yes, what are they doing? If not, why?
- Do you practice portfolio management? If yes, how are you doing it? If not, why?
- Could you explain the connections between “business level departments” such as marketing, sales, analysts, and others who work with the market and customers?
• How does the customer participation affect software product management? Can the customer affect software product management processes or decide anything?
• Does the intended purpose of the end-product affect software product management? If yes, why and how?

Software product management improvement
• In which areas, in your experience, software product management should be improved?
• Name three most effective practices that help to create successful products? Why are they effective? Have you defined them in writing? If yes, what details do they include? If not, why?
• What kind of knowledge is most beneficial to create your products? How can this knowledge be obtained?
• Could you tell a story of running the product in your organization from the idea to the market?

The company context
• What are the current unmet customer/end user needs? In your opinion, why do you think they have not been met? How do you plan to fulfill them? Do your product managers pay attention to this?
• How do you measure and optimize the business performance in your organization? Is it effective? If yes, how? If not, do you have any improvement ideas?
• Could you describe several unique features of your organization? How do they affect your business and internal processes?
• Could you describe your competitive advantages? How do they help you to be successful in the market?
• In your opinion, what market trends will influence your business in the nearest time?

Other questions
• Is there something you would like to add to your answers or something regarding software product management that you think should be mentioned?
• Do you have any questions?