Software product management – An industry evaluation

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ABSTRACT

Product management is a key success factor for software products as it spans the entire life-cycle and thus ensures both a technical and business perspective. With its many interfaces to various business processes and stakeholders across the life-cycle, it is a primary driver for requirements engineering in its focus on value-orientation and consistency across releases. This article provides an overview on product management in software and IT. It summarizes experiences with introducing, improving and deploying the role of a product manager. In order to get a profound industry overview we performed a field study with interviews and concrete insight across fifteen different organizations world-wide on the role of the product manager and its success factors. As a technical solution we present four success factors identified from the research and show how they address the challenges we identified in practice. The novel part of this research and technical study is the industry survey and evaluation of resulting solution proposals. We found that with increasing institutionalization of a consistent and empowered product management role, the success rate of projects in terms of schedule predictability, quality and project duration improves.

1. Introduction

Software and IT move on a fast highway. When looking in the rear mirror though we see many companies and endeavors which failed due to overemphasizing technology and not sufficiently implementing a sound business strategy. Take Netscape. For many of us it was the first experience of the Internet. In 1995 it had a market share of 80\% – more than enough to stay in the pole position forever, as companies such as Google or Amazon show. But already in 1997 it slowed down, lost market share, and in 2003 went into bankruptcy. What went wrong? One of the managers put it in simple words: “We had no product management; it was just a collection of features.” (Cusumano and Yoffie, 1998) More recently and in another domain, a previous Nokia senior manager claimed that the lack of product management is the primary reason for their loss of market shares in the past years (Heikkinen, 2012). On the other hand, we all know companies such as Apple, Google and SAP and their excelling product management, which translates – often unspoken – needs to requirements and to customer value.

From this introductory story it seems as if product management ensures that products have a clear business focus and are not mere feature collections. We wanted to dig deeper and identify the state of the practice in product management and what we can learn from it. We conducted a field study with interviews across fifteen different Business to Business (B2B) organizations world-wide on the role of the product manager, its challenges and success factors. As a technical solution we present four success factors identified from the research and show how they address the challenges we identified in practice. A concrete case study from the B2B environment which the authors have performed based on these success factors will show how we have introduced and improved software product management, and what was achieved. We found that with increasing institutionalization of a consistent and empowered product management role, the success rate of projects in terms of schedule predictability, quality and project duration improves.

Before outlining best industry practices in product management, we need to clarify some terms (Ebert, 2012; Ebert and Dumke, 2007; SPMBOK, 2013). A product is a deliverable which delivers a value and an experience to its users. It can be a combination of systems, solutions, materials and services delivered. A service is an intangible, temporary product that is the result of co-creating value by at least one activity performed at the interface between the supplier and customer and that does not imply a change of ownership. A solution is a customer-specific product created from different products, processes and resources and tailored to serve a specific business or customer need. Product management is the discipline and business process which governs a product from its inception to the market or customer delivery and service in order to generate biggest possible value to the business. Note in this

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context that while we consistently speak about “product management” we also include “solution management” which in the software industry is rapidly gaining importance. Product management as a business process overarches and provides leadership to activities such as portfolio management, strategy definition, product marketing and product development. The successful product manager not only masters the life-cycle processes, he is the owner. He must get as early as possible and way before project start a good systems perspective to judge on value proposition and priorities. He has to balance projects, people and politics. His primary tools are roadmaps, requirements, milestone reviews and the business case.

Fig. 1 provides an overview on an archetypical product life-cycle and shows how different projects integrate toward an end-to-end view on the product (Ebert, 2009). It highlights the differences between managing a project and managing a product. The project is a temporary endeavor undertaken to create a product. The difference between project and product management is exactly this focus on delivering one specific product in time, budget and quality – while the product manager looks to the overall market success and evolution of this product together with its subsequent releases and related services.

The product manager leads and manages one or several products from the inception to the phase-out in order to maximize business value. The value of a product in this context is an economic category, which forms the basis for comparing and charging totally different supplies and services in a particular quantitative relationship to each other (Ebert, 2012). Value is expressed in money, the price, and is determined by the supply and demand. Business value is the value of a product for a business. It depends on the customer value, which is the perceived value in a market (Ebert and Dumke, 2007).

The product manager is responsible for the entire value chain of a product following the life cycle and asks: How do we improve overall business? The project manager is in charge of delivering one specific product in time, budget and quality. He is accountable for business and customer success within a contract project. He manages the project plan and its execution and asks: How do we get all this done? The marketing manager determines how to sell a product or service in order to create a customer experience. He communicates the value proposition to sales and customers. The marketing manager drives the sales plan and execution and asks: How can we sell more?

Fig. 2 shows value creation in the cycle of responsibilities with respect to above mentioned roles. Obviously there are mutual interdependencies. The software product manager needs inputs from software development and marketing. This is why to our experiences a core team with all these roles is a very big success factor for making product management a success.

2. Product management research

Over the years we have investigated product management and its impacts in hundreds of technical products with different origin, development pace and size (Ebert, 2012; Ebert and Dumke, 2007; Ebert, 2007). More recently at Vector we have started to perform periodic surveys of product management best practices with our clients. These are companies engaged in software, both IT and embedded to technical solutions, which operate on a global scale. From these best practice surveys we have distilled some best practices which we will briefly highlight. We have worked with these techniques and found that they sustainably improve product performance. First we will provide an overview from research.

Many software companies look too much on projects, technology and features, and not enough on value, market understanding and products. Only 52% of the originally allocated requirements appear in the final product release (Ebert, 2012). The study found that mostly this is caused by dysfunctional organizations not having a clear product owner with assigned business accountability for its success. In a similar study looking at new product development from a broader scope, Cooper (2004) found in 105 business units from various industries that the top 20% of enterprises deliver 79% of their new products in time, while the average delivers only 51% in time. The challenge in many IT and software companies is lying in better connecting sales and marketing with strategy and product development (Cusumano and Yoffie, 1998; Heikkinen, 2012; Ebert, 2007).

Products are pushed to the extreme to be ever more efficient and done at low cost, but when they hit the market will not sell as expected. Or customers demand many changes, thus reducing margins dramatically from initial targets. Software managers, even in senior positions or as founders of companies, often tend to overhear the voice of the customer. Technology matters, the schedule needs to be kept, features are lined up like a washing list. Poor product management causes insufficient project planning, continuous changes in the requirements and project scope, configuration problems, and defects. The obvious – yet late – symptoms are more delays and overall customer dissatisfaction due to not keeping commitments or not getting the product they expect. Being late with a product in its market has immediate and tremendous business impacts (Ebert, 2009; Cooper, 2004). In contract business this often means penalties, and in practically all markets it reduces customer loyalty and the overall returns from sales.

Product development, such as for IT infrastructure, software components, or embedded electronics, traditionally concentrates on the project perspective looking to execute in budget and time. In software, IT and systems engineering, project execution can be rather easily improved by means of the Capability Maturity Model Integration (CMMI) and on basis of lean and agile principles (Ebert, 2012; Ebert and Dumke, 2007).

We performed root cause analyses of hundreds of products that underperformed and found similar causes reappearing. Root causes
included business cases that were never re-evaluated, unbalanced portfolios that strangulate new products, insufficient management of new releases and service efforts, and the lack of vision that caused requirements to continuously change (Ebert, 2012; Ebert and Dumke, 2007). In working with product managers in many companies around the world we achieved reduction of delays of 20% per year (Ebert, 2012). Explanatory factors for this positive impact of product management include leadership and teamwork, managing risks and uncertainty, mastering stakeholder needs, and accountability toward agreed business objectives and accountability – managed by one empowered person across the product life-cycle. The same holds for efficiency. For instance, we found that with a requirements change rate beyond 20% in a project, productivity falls (Ebert, 2012; Ebert, 2007).

A major area of research in product management is on the interface between needs and requirements on one side and the business model on the other side. Wohlin and Aurum (2006) have been looking to the business side of requirements, how to abstract requirements. They identified the major drivers to prioritize requirements and align with business needs early during elicitation. Gorschek et al. (2010) have looked to several projects and tried to identify some underlying variables to better decide on priorities and implementation. They found that too often some critical stakeholders are overlooked and priorities are given on ad-hoc decision-making. One key reason they identified is that the requirements are described on different abstraction levels so they are not mutually understandable for different stakeholders. The problem is not so much that stakeholders are not known, however that the interdependencies, roles and expectations to requirements are unclear. It is easier to talk to engineers in identifying requirements than to trace needs from various groups to concrete technical requirements. But only this latter approach proves to deliver value from a business perspective. We will show from our field study that insufficient stakeholder collaboration is still a major challenge in product management. Gorschek et al. (2010) have proposed a lightweight greenfield process for product innovation but did not mention in their research that a vast majority of all product management work relates to products in maintenance and service.

Aside the individual requirements elicitation and prioritization another field of research in the domain of product management is about roadmapping. Roadmapping is an important phase of the requirements engineering process performed at product level. It is concerned with selection and assignment of requirements in sequences of releases such that important technical and resource constraints are fulfilled. Wohlin and Aurum (2006) have been investigating criteria to select requirements. They used a cluster mechanism to provide priorities and group related requirements according to value. Ruhe (2010) provides in his seminal work a good overview on techniques for roadmapping starting with a technology driven roadmap approach and providing techniques and a tool for mapping requirements to the roadmap. Svahnberg et al. (2010) evaluate to the different release planning methods and how they compare with each other. These studies conclude that although many models are available from research, they use similar techniques to address the release planning problem. While several requirement selection factors are covered in the different models, most methods fail to address factors such as stakeholder value or internal value. We found in our empirical study a similar result with respect to specifying value dimensions and getting sustainable stakeholder commitments.

Several industry studies had been performed on software product management and its relationship to requirements engineering. Karlsson et al. (2003) had been looking to industry practices and identified several challenges. They took a qualitative approach using interviews at eight software companies. A number of challenging issues were found, including communication gaps between marketing and development, selecting the right level of process support, basing the release plan on uncertain estimates, and managing the constant flow of requirements. Gorschek et al. evaluated requirements engineering practices in light of business models and underlying selection criteria (Wohlin and Aurum, 2006). They looked to product strategies and how they are used to enable early and systematic acceptance or dismissal of requirements, thus minimizing the risk for overloading. van de Weerd et al. (2010) and Vlaanderen et al. (2011) are looking to the more recent introduction of Scrum and agile techniques to product management and its industry reception. Scrum seems to be the ideal vehicle in small set-ups to relate the frequent iterations in product development to a backlog of requirements which then can be connected to release planning that is the more abstract product management backlog.

Based on these industry best practices and lots of academic research the Software Product Management Body of Knowledge (SPMBOK) has been created over the past years (SPMBOK, 2013; Ebert, 2009). It has been continuously improved on the basis of introducing and optimizing software product management in companies around the world. These companies with which we are working are of different size and with very different product types, both business to business (B2B) and business to consumers (B2C). Fig. 3 shows the underlying knowledge area framework of the SPMBOK (SPMBOK, 2013). It is horizontally split into the major life-cycle phases. Each field in the table represents a knowledge area. The gray fields represent the core knowledge areas which each product manager must know and actively pursue. Others are optional in a sense that some bigger organizations might allocate these domains to other roles that would support the product manager. Needless to say that the software product manager must be knowledgeable on these areas in order to best perform his role.

A major drawback of these studies is that although software products management is increasingly based on a methodological framework (SPMBOK, 2013; Ebert, 2007), most research is done in rather small settings and looking primarily to small and medium-sized software and IT companies. However, most software product management happens in organizations with very heterogeneous products where software plays a pivotal role (e.g., Apple, Google, Microsoft, Oracle, SAP) or where major software releases are embedded to systems (e.g., GE, GM, Philips, Siemens, Thales, Toyota). We will in our industry survey address this gap and provide insights from these companies with respect to software product management and requirements engineering.

3. Industry survey

In order to better understand software product management in the practical context, we performed a benchmarking survey in companies. Fifteen representative companies had been considered in this benchmark. We selected the companies primarily to represent different industries and have a certain size so that “product management” as an individual role inside the organization would be expected to be known. They all have globally acting business units and diversification across at least two industries in B2B. Their products are software-driven, but often combined with a good share of systems engineering.

The scope of all companies in this survey is software-driven systems, such as in automotive, information and telecommunication, energy, medical, industry automation. One third of the companies have each over 100,000 employees worldwide, half has 10,000–100,000 employees and the rest are small and medium sized companies with around 1000 employees. The benchmarking includes companies such as ABB, Bosch, GE, Google, Philips and Siemens. Fig. 4 shows how the companies map to different industries. The four segments in this figure had been selected to
provide representative mappings. “Systems” comprises companies delivering rather extensive systems with mechanical, electric and of course software and IT components, such as transportation, security or healthcare systems. “IT” includes companies with their primary focus on information technology systems, such as communication and Internet solutions or finance systems. “Services” includes companies with primary focus on IT related services, such as consulting, outsourcing. “Embedded” finally covers companies with a primary focus on embedded software systems such as electronic components for automotive or automation.

We have been asking at least ten questions in the form of an interview. The questions were asked in an open way, thus demanding explanations, which could guide us to more questions. All interviews had been done by the same person on our side directly or per telephone. To address a representative audience and avoid fishing for results, we typically asked three types of persons in each company, namely a product manager, a senior executive and a technical manager in development. The latter served as a verification point who could observe the effects and visibility of product management from a rather independent position. In all cases we talked to at least two persons to avoid subjective results when only speaking with one person. If there were differences detected between the first and second interview partner, we addressed those openly. In total we talked to more than forty persons in these organizations, worldwide. We ensured with this survey method that we received results which we always could validate inside the same company.

The minimum subset of questions asked in each interview included the following ten questions:

1. What position has product management in the enterprise?
2. What are successful role models?
3. How is the product manager measured?
4. What are the environmental success factors for a product manager?
5. What are the best practices of a product manager?
6. What are the challenges and risks?
7. How product managers selected and what are the typical career paths?
8. How do companies train product managers and grow their skills and competences?
9. Which external standards related to product management are used?
10. Are external certifications used for product management?

In the survey, we did not find any evident influence of company size on the penetration of product management practices and competences. In fact, amongst the best companies were both an industry giant from Asia and a small enterprise in Europe.

53% of the interviewed companies have the vision that the product manager is the end-to-end responsible for the success of the product. In reality however, only 33% are actively implementing this vision. This means that about half share the concept of a strong product manager. For the other half, product managers are mostly subordinate to marketing and play an administrative role, such as maintaining technical roadmaps.

Today, the position of product management varies across companies and often inside a company, from being part of R&D or marketing to being the business manager with profit and loss (P&L) responsibility for a product. The role of “product manager” increasingly evolves toward product and solutions. Other roles such as project manager have much clearer definition and roles. Two thirds see leading global teams as major role model, but also recognize intercultural barriers and thus stay with localized product management teams close to customers.

Measurements and performance indicators are a key instrument for product managers. All companies measure product managers based on annual targets, such as sales or growth. Mostly objectives are shared within a product team. All who empower the
product manager, measure P&L as key performance indicator. However, only one third have actually P&L responsibility delegated to the product managers. The vast majority (over 80%) of a product manager’s effort is for managing an existing product, and not for new products and innovations. This means that most effort and skills are used for products in service, which from a software and IT perspective seems natural, but also explains why so much of research topics, which is related to innovation and new products does not arrive in reality, which is related to product service and evolution.

Most product managers in software and IT advance from a technical career and grow into this discipline, lacking any form of formal education. There is no typical career path both into and inside product management. In Europe and Asia product managers mostly evolve from the technical role, such as technical project manager. 27% of the companies practice a systematic competence management and training program. This correlates high with product management success across the interviewed companies. Internal certification is used by 20% of the interviewed companies for global consistency. Typically such internal certification is developed and provided by external suppliers under leadership of human resources. External certification is not used, as opposed to project managers. The reason is that often the product management role is very much tailored to the company specific needs and constraints, so that an external standard would not bring much value. Several senior managers with whom we talked perceive that there is currently a “flood” of certification programs which in the end only “fill up CVs of people applying for other positions”. This seems to be different from project management, where there had been a rather strong focus on standardized roles and curricula over the past two decades.

We mapped the introduction and thus “maturity” of an organization’s product management according to the typical three steps in the underlying organizational change management, namely foundations (or awareness), pilot (or achieving visibility) and roll-out (or getting to all incumbents). Fig. 5 exhibits these three phases. In our industry survey we found that one third of the companies were already in roll-out, another third was in foundations and initial pilots, and yet another third did not start anything yet. The figures did not change over the past two years since the initial survey had been done, which highlights that a strong and effective product management needs substantial organizational – and individual – change management. This need for professional change management is often underestimated. Many companies still primarily focus on training programs, while not even having a clear responsibility mapping available. Fig. 6 shows the mapping of the introduction degree of product management to the interview sample. On top of the 3 above described categories we introduced an “initial” category of companies which have just created awareness that product management needs improvement, but have not yet started.

Since we found a majority of software product managers with a strong technical background and rather weak finance, marketing and general management skills, they tend to focus on what they know best, namely technical topics, such as requirements specification, roadmapping and architecture design. Looking only to technical aspects might help to master technical projects. However these product managers are not really pursuing a product management role as we defined it in the introduction. One Business Unit Vice President (BU VP) pointed out: “We had many so-called product managers which were just promoted from a technical role without a clue on the business needs and skills they should have.” In consequence they are not content with the role and rather often in our interviews blamed “politics” for not achieving their missions. These product managers do not master their role. Insufficient requirements engineering is typically the first sign of product management failure. Even as they try to specify requirements, they are not developing requirements with other stakeholders. Two reasons are named by the interviewees, namely insufficient exposure and too many technical decisions they have to make.
There seems to be in many companies a vicious circle of insufficient competences and in consequence a weak perception of the role and its incumbents by senior management, which in turn would not strengthen the role. Practice often seems to contradict the role model of value generation which we introduced above (see Fig. 2). Product management in two thirds of the companies we talked to was not really influenced by product managers for that reason. The difficulties with misunderstanding needs, changing and creeping requirements, missed deadlines and budgetary commitments and failing business opportunities can only be cured with a thorough understanding and implementation of the product manager’s role.

What are the obstacles in product management? The persons we talked to addressed four key challenges, namely

1. Dysfunctional organization with unclear responsibilities and silo work which results in continuously changing focus and schedules.
2. No standardized processes across the company with a slow and cumbersome decision-making process and many individual ad-hoc agreements.
3. Insufficient requirements which are often just collections of what had been heard at customer visits and other such events, but not mapped to value creation and business cases.
4. Lack of strategy and unclear strategy and roadmaps with unclear dependencies and fuzzy technical requirements and impacts.

We will address technical solutions to these challenges in the next section.

4. Technical solutions to advance product management

Looking to the articulated challenges on one hand and successful companies on the other hand, we found four success factors that will help advancing product management:

1. Core team to have reliable commitments from all functions.
2. Standardized product life-cycle to have clear interfaces, milestones and governance.
3. Requirements that transport the customer value to ensure business focus.
4. Portfolio management and roadmapping to facilitate transparency and dependency management.

These four success factors had been most often named by the interviewees as what facilitates success as product managers. We will briefly explain these four topics. In the following section we will then show a case study where we have been introducing product management while considering these four success factors. We do not claim that this set is comprehensive; however underline the emphasis they received as top four from a longer list.

(1) Product managers uniformly claim that different stakeholders have unaligned agendas which make the project late and cause lots of overheads and rework. The first success factor therefore is to formally create a core team with the product, marketing, project and operations managers for each product (release) and make it fully accountable for the success of a product. These persons represent not only the major internal stakeholders in product or solution development, but also sufficiently represent different external perspectives. The multi-disciplinary core team leads the product development in all its different dimensions. Decisions are taken and implemented by the respective function, such as deciding requirements priorities, test strategy, increment planning and backlog. This core team is operational throughout the product life-cycle. The success factor is to give this core team a clear mandate to “own” the project. Too often we face silo organizations in marketing, product management and engineering that do not work together. This means in many cases not only to build teams, to train and to coach, but also to adjust annual targets and performance management. Culture will change when targets are adjusted to such team ownership.

(2) A standardized product life-cycle should be mandatory for all product releases, i.e., all engineering projects. Most companies today have such life-cycle defined but rarely use it as the pivotal tool to derive and implement decisions. Too often, requirements changes are agreed in sales meetings without checking feasibility and technical decisions are made without considering business case and downstream impacts. A useful product life-cycle has to acknowledge that requirements may never be complete and may indeed be in a “continuum” state. The product life-cycle should guide with clear criteria, i.e., determining what is good enough or stable enough. This implies that it is sufficiently flexible to handle different types of projects and constraints. Requirements and business objectives must be managed (planned, prioritized, agreed, monitored) throughout the life-cycle to assure focus (Ebert, 2009). To avoid reporting overheads we recommend using online workflow support to instrument such product life-cycle.

(3) Good product management understands the customer’s voice and business case and then develops necessary features. Each single requirement must be justified to support the business case and to allow managing changes and priorities. If a product is developed without business rationales behind its requirements it is in trouble because the requirements will continuously change. A product or solution must address a need and must have a strong business vision. This vision (i.e., what will be different with the release of the product) must be coined into a story. The story then translates to business objectives and major requirements. Requirements are a contract mechanism for the project internally and often for a client externally. They must be documented in a structured and disciplined way, allowing both technical as well as market and business judgment. Ask a tester to write a test case before processing the request. Ask the marketer in the team to check whether he can sell the feature as described. Determine what is good enough and ensure that any further insight is adequately considered. After evaluation they are approved by the core team.

(4) For each product the product manager drafts a high level roadmap document with the product strategy and the functional and technical features planned in releases for the coming years. Managing and maintaining roadmaps and the own portfolio as a mix of resources, projects and services must be the focus of each product manager. With moving targets, the sales department has no guidance how to influence clients, and engineering will decide on its own which technologies to implement with what resources. When it comes to his own portfolio, the product manager has to show leadership and ensure dependable plans and decisions that are effectively executed. Apply adequate risk management techniques to make your portfolio and commitments dependable. Projects may need more resources, suppliers could deliver late or technology will not work as expected. As mitigation, platform components used by several products might use resource buffers, while application development applies time boxing. If there is a change to committed milestones or contents within your portfolio, they must be approved first by the core team and where necessary by respective business unit management, and then documented and communicated with rationales.
5. Industry case study

To better illustrate product management in an industry setting, we will present here a case study from introducing software product management on a broad scope while considering the above four success factors. Introducing product management needs energy and time. It will not happen on a push-button approach. Tangible results were available after around 12–18 months of working in the new scheme with strengthened product management. Typically the time to full implementation gets longer with larger organizations and longer product life-cycles, as indicated in the first case. This is what should be considered a normal learning curve when introducing product management as described Section 3 above from the interviews but also in earlier studies (Ebert, 2007).

Improved product management has profound positive impact on the overall business. For instance, strengthening the product management role, as sketched above, at a major system supplier showed that duration (time to market), schedule adherence and deliverable quality all sustainable improved while introducing and improving product management. The data is drawn from a single business unit. The business unit that we selected was amongst the first to introduce consistent product management in a defined way. It operates in North America, Europe and Asia, thus assuring representative results independent of geography. The products of that business unit are components used in communication networks. They comprise platform products that are developed typically every few years and then customized for contract projects. The approach behind is product-line driven, so that platform products would have the basic functionality and customer products are enhancements (or changes) to those platforms. There are also network management systems included which help to configure and operate these products.

In order to achieve business success, the product manager has several objectives in this organization: Creating a winning product and business case and deliver value to customers. As a control variable we took the degree of implementation of the product manager role. Naturally there was a product manager role available since long, however the responsibilities, competencies and operational behaviors were very heterogeneous. Only with an orchestrated approach toward defining a competence profile for product managers, aligning their roles and responsibilities versus other roles in the same organization (e.g., marketing manager, project manager, regional sales) triggered more consistent and effective behaviors.

We mapped the implementation degree of the product manager role to three phases (see also Fig. 5):

- **Phase 1: Agree foundations.** A sense of urgency was created with some critical stakeholders in the organization to strengthen the role of product manager. Leading product managers were brought together and assessed success factors and the elements of the role. We aligned the new role elements to other related roles, such as marketing manager or project manager, on the one hand, and we benchmarked with other companies to formally establishing the role. In order to have one baseline for major responsibilities and how they are mapped to roles in the organization, e.g., what is done by the product manager, and what is done by the project manager, we recommend the RACI approach which maps major tasks and deliverables to who is responsible, accountable, and – potentially – consulted, or informed.
- **Phase 2: Prepare and pilot.** The standard product life cycle was enriched with more templates, self-assessment tools, training materials and hands-on success stories. Training modules were piloted for key functional competences, such as the writing of a customer business case.
- **Phase 3: Roll out.** The longest phase dealing with deployment was performed using progress measurements for monitoring and deficiency identification. Incumbent product managers and the newly trained community provided continuous feedback helping in identifying further improvement needs.

The impact of each of these three phases could be deducted from our history database by means of mapping product releases (projects) to dates and organizations. We looked to an overall total of 178 projects without any filtering (Fig. 7). Each phase has a representative set of projects. As a rule of thumb one would need at least 10 projects per dependent variable being analyzed. Size is represented from very small projects (few person weeks) up to several hundred person years. The dependent variables of our study are average duration, average delay as percentage of schedule overrun compared to originally committed release dates and quality level in terms of defect detection percentage after handover. First success was achieved in the smaller business units after one year. Larger units needed two to three years for full implementation. We achieved within three years of strengthening systematic product management in phase 3 (institutionalization) an improvement of 36% in average duration, 85% in delays and 82% in quality. Fig. 7 summarizes the results. The table is built in a format to show in the left column the respective change management phase to which we looked. “Not aware” did not apply as the organization had already decided to improve their product management and align it across the entire company. The next columns provide some information about the underlying data points, namely number of projects to which we looked, and their size. We then show on the right side some results in this longitudinal study, namely delay, duration and defects.

6. Threats to validity

As in all empirical field studies we need to look to threats to the validity of the results which we have framed in this industry state of the art report. An empirical study is a test that compares what we believe to what we observe. Field studies on the basis of interviews pose the risk that by selecting interviewees or asking specific questions, the interviewer will influence the results heavily. On the other hand, such field studies, when wisely constructed and executed, play a fundamental role in science, because they relate what we see from theoretic articles toward what is actual industry practice. They are a bridge for effective technology transfer. Specifically, they help us understand how product management works in practice, and allow us to use this understanding to further grow the underlying software product management framework.

Three aspects of the quality of a field study need to be discussed, namely construct validity, internal and external validity (Ebert and Dümke, 2007). This section discusses how, and the extent to which, threats to construct validity, internal and external validity are undermining the interview results.

Construct validity observes the quality of choices about the particular forms of the independent and dependent variables. We will look here toward the measurement per se, that is how we obtain results from interviews (Ebert and Dümke, 2007). The data collection was determined by the standardized questions we have been asking. All questions had been asked by the same person who on one hand has good insight into software and IT organizations and business, and on the other hand had been doing such surveys for over two decades in different settings. The mapping of answers to
variables was defined, e.g., the phases in the roll out of the product management competence, or how the “success” of product management in an organization was measured. A key question of course is whether it makes sense looking to product management across different organizations, given that product management neither has a solid underlying theoretical foundation which is taught at universities in a standardized way, nor is it applied equally due to its situational and environmental dependencies, as we pointed out above. All large software projects follow some underlying development process that includes stages such as requirements definition, functional design, unit implementation, integration, and so on. The way in which these stages are conducted, the methods, roles and processes that are used to support them and the rationale for doing so deeply vary. Interviewees were not promised to get immediate access to the results from their peers. In Section 5 where we look to a specific case study all data had been gathered electronically from the various underlying operational databases.

Internal validity ensures that there is no manipulation in the data sets and relations between these observations. We will look here specifically to the selection of companies, interviewees and questions (Ebert and Dumke, 2007). In Section 4 we show a set of four success factors in software product management. These could of course been seen as dependent on how companies and interviewees are selected, or how the questions had been asked. We have been selecting companies with respect to their visibility in B2B who can be seen as representative. We had not been in business relationship with the participating organization entities before the interviews. No company which we asked on the first contact refused the interviews, thus eliminating the risk that only good organizations would participate. No organization or person was dropped from the list thus reducing the risk that we select only results which fit to an expected scheme. The interviewees had been selected on two types of contacts, namely people who perform the task and people who observe the task. In some cases we had access to people in the engineering and IT organizations which we know for a while and who we could trust. We used these persons to obtain a confidential judgment how they see product management in their organizations.

As a general observation we found that in organizations that are just starting with systematic product management, there is hardly any positive image of product management. Insufficient focus on systematic product management together with inadequate incumbents shapes a negative picture – which often hinders improvements. Since we did not expect a specific result, such as “product management has improved over the past year”, we also avoided the risk of selecting wrong populations. The questions had been asked uniformly exactly following the above mentioned scheme. We introduced each interview with a brief description of method and rules, and then made sure that each question was asked once. Order of questions was kept according to the list. Although we attempted an exhaustive search of differences in characteristics across software and IT product management, it is possible that they differ in some way not measured by our analysis. Further study is required to determine to what extent each of these practices actually helps. In Section 5 we reduced the risk of inadequate data selection by using a large systems company with global presence and many different products and projects over several years when building the product management competence.

External validity ensures that an observed causal relationship is robust over variations in persons and environment. We will investigate here the impact of interviewees’ attitudes and environment on the obtained survey results (Ebert and Dumke, 2007). Clearly some of the product managers with whom we had spoken could overrate their own role and results, while others could underrate it – both because they expect some effect from it from the interviewer. Also a current business review with a invalid business case could easily trap a senior manager in telling that product management in his organization is immature. These personal effects are difficult to completely avoid. For that reason we introduced the interviews with some rules, one of them being that the person should look toward the past year and carefully avoid distortion by a recent singular event. In one case for instance the business unit was dramatically underperforming and we helped to identify a scenario before the current downturn had started. This means that not all surveys report the current timestamp. Some could reflect indeed the timeframe of the past two years. For that reason we also repeated some interviews during the past months in order to see what had changed and what remained stable.

7. Conclusions

Product management is the management of a product, including solutions and services, over its life cycle with the objective of generating the biggest possible value to the business. It is a leadership role inside the company that ensures empowerment and focus on business results on the lowest feasible level. This article has briefly introduced to product management in the software and IT domain by looking to an industry survey and to a concrete case study.

We have provided results from an industry survey with fifteen companies on how product management is actually deployed, and with which effects. Results have been condensed to show success factors and their effects on business. Key challenges have been highlighted such as unclear responsibilities, local optimization, and moving targets in terms of requirements, features and schedule. We have identified four success factors to overcome these challenges. These success factors have been distilled over the past years with many companies and have been validated in different environments. The interviews underlined their practical relevance.

The described four practices for systematic product management translate to more ownership, leadership and motivation in product development teams and at their interfaces. To be practically deployed, each practice must be supported with templates, examples and training that are adapted to the specific business model and market positioning of a company. The practices depend on each other. The practices and overall product management framework can be gradually introduced. We showed with a concrete case study the effects of using these best practices in a B2B company. Practitioners in engineering, product management and marketing accepted these practices because they yield concrete performance improvement and stimulate empowered project teams.

With the success of companies such as Apple, Google or SAP based on their excellent product management, software product management has recently gained wide-spread attention. Most large companies with software products or IT services are developing software product management competences in order to lead a product and its evolution by one person with clear focus. Without a product manager in the driver seat there are many stakeholders “involved” while nobody takes leadership and ownership. Performance is below expectations and people in different functions complain about lack of focus, while rework and delays grow.

We will conclude with a quote from a VP product management in one of the organizations with whom we had been working on competence evolution over the past years. “Product management has a pivotal role for us. They are the glue that brings together operations, marketing and engineering. Product managers must have a 360-degree view of their company’s operational activities while keeping a strategic view on product opportunities and strategy. Given these responsibilities, product manager skills sets are diverse, comprehensive and challenging. And the investment to development of these skill sets is a priority. We have placed a high value on identifying and
communicating the role and then develop our product management teams. We have seen a clear return on investment, which is concretely documented in a growing and profitable revenue stream. We have seen the benefits of product management in terms of reduced delays and faster product acceptance in the market. The benefits of investing in our product managers training has far outweighed the cost.”

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References


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