ISPMA
INTERNATIONAL
SOFTWARE PRODUCT MANAGEMENT
ASSOCIATION

Software Product Management

Excellence In Strategic Management

V.2.0 Student Edition

This syllabus was written by the following members of the International Software Product Management Association (ISPMA®): Barbara Hoisl (editor), Christof Ebert, Robert Huber, Hans-Bernd Kittlaus, Andrey Maglyas, Lars Olsson, Karl-Michael Popp.

We thank all honorary authors and contributors.

Preface

The goal of the International Software Product Management Association (ISPMA®) syllabus for "ISPMA® Software Product Manager Excellence in Strategic Management" is to deepen the understanding of the role of product managers in relation to strategic management.

This syllabus covers the key elements of software product management practices related to strategic management according to the ISPMA® SPM Framework, which is well supported by research and industrial practice. The syllabus corresponds to **a two-day industry course**.

The syllabus addresses the needs of product managers participating in strategic management practices like corporate strategy, portfolio management, innovation management, resource management, product analysis, and market analysis.

The syllabus is the basis for examination to certify that the examinee has achieved the degree of knowledge described in this syllabus. The terms used in this syllabus are consistent with the glossary of the ISPMA®.

Purpose and structure of the Syllabus:

The syllabus is the basis for consistent training learning and examination of software product management. It provides:

- Explicitly phrased educational objectives for each chapter, and
- Informal explanations to detail the educational objectives.
- Informal references to literature (without limiting the interpretation of the syllabus to this literature only).

The syllabus consists of **eight chapters and one appendix**. The first chapter covers the essentials of strategic management and its relations to software product management. Chapters 2 to 8 cover the seven strategic management practices described in the ISPMA® SPM Framework. Each chapter has educational objectives (EOs) that are enumerated following the chapter headers (EO1.1., EO1.2, …) An educational objective has a defined cognitive level of knowledge that the course participant is expected to achieve. The numbering scheme for these objectives is aligned with the chapter numbering.

The educational objectives are expressed in terms of three cognitive levels of knowledge phrased using the verbs "knowing" for level 1 and "understanding" for level 2, and "applying" for level 3. These three verbs are placeholders for the following:

- L1 (know): enumerate, characterize, recognize, and name.
- L2 (understand): reflect, analyze, execute, justify, describe, judge, display, design, develop, complete, explain, elucidate, elicit, formulate, identify, interpret, reason, translate, distinguish, compare, understand, suggest, and summarize.
- L3 (apply): perform, execute, develop, and adapt.

Each EO in the syllabus has one or more of these cognitive levels assigned to it.

In order to address L3 objectives, ISPMA®'s Excellence syllabi are designed to put special focus on exercises. It is the trainer's responsibility to select exercises and to define concrete realistic scenarios in which all the selected exercises can be performed by the participants. ISPMA® recommends to spend about 50% of the available time on exercises. In trainers' material, exercises are described in abstract terms.

Included and excluded key areas:

The syllabus covers knowledge applicable for any kind of software systems and organizational contexts. A training course may cover more domain-specific details if needed by the course participants. This syllabus, however, does not provide guidance for such specialization, rather describes the base knowledge necessary, which can be complemented with domain specific items. The syllabus is independent of any specific process model, and thus defines knowledge of a software product manager without prescribing exact interfaces to other roles in a product organization.

Training courses:

The syllabus corresponds to a two-day industry course. The syllabus does not prescribe the specific form and approach of learning, however. It can also be administered with other forms of teaching or learning, such as self-learning supplemented by coaching or courses at universities or universities of applied sciences.

Training providers are encouraged to tailor training courses to the participants, and to add examples and an appropriate realistic scenario for the exercises described in this syllabus so that participants get an opportunity to apply the training contents. A participant should carefully choose the training provider. A list of training providers can be found on the ISPMA® web site www.ispma.org.

Examination:

The syllabus is the basis for the examination for the ISPMA® certificate "ISPMA® Software Product Manager Excellence in Strategic Management." All chapters are relevant for the exam. The exam takes the following form:

- Demonstration of knowledge with a multiple-choice test.

Multiple-choice tests can be held immediately after a training course, but also independently from courses (e.g. publicly announced exams of the examination authorities). A list of accredited examination authorities can be found on the ISPMA® web site www.ispma.org.

Course participant prerequisites:

The training and learning of the syllabus assumes general knowledge of, and some experience in, the management or development of software products or software in software-intensive systems.

The educational background of the course participant is not crucial (whether it be engineering or management), rather the level of experience is predominantly the factor associated with the prerequisites. A course participant should have the Certificate "ISPMA® Certified Software Product Manager – The Foundation" or at least three years of experience in software product management. However, this is a generic recommendation and might not be applicable for all situations or course participants.

Terminology

The term SPM is used as an abbreviation for Software Product Management. It represents the function of SPM and not the individual person.

This curriculum usually uses a gender-neutral form. In cases where the masculine form is used, this is done for readability reasons and represents any other gender as well.

The terms used in this syllabus are consistent with the glossary of the ISPMA® available at ispma.org.

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EU1 Strategic Management Essentials

Duration: 1:00 h

Educational Objectives:

EO1.1: Understand the role of a product manager in relation to strategic management.
EO1.2: Know in which strategic management activities a product manager needs to be involved in and what level of involvement is expected (core activity of a product manager vs. participation).

Strategic management helps an organization to define, plan, agree, implement and evaluate its strategy. Fig. 1 shows the example strategic management process.

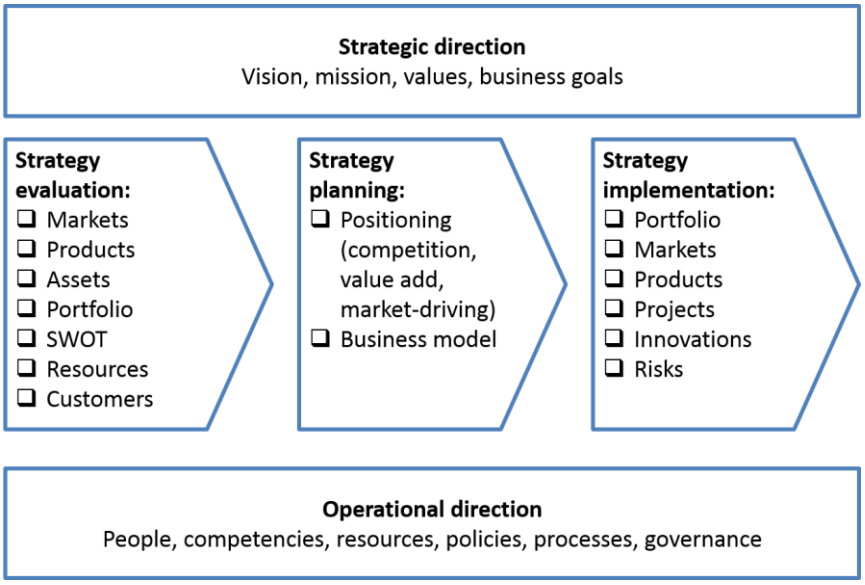


Fig. 1 Strategic management processes from *Ebert and Dumke (2007),* Used with permission.

Product managers provide **inputs** to strategic management activities and receive **guidance** for their work in return. Regarding inputs, software product managers can have two different levels of responsibility: participation or contributing inputs, and full ownership. According to the ISPMA Software Product Management Framework, software product managers typically **participate** in the following strategic management activities:

- Corporate strategy
- Portfolio management
- Innovation management
- Resource management
- Compliance management

For Market Analysis and Product Analysis, corporate functions are typically responsible in larger companies with the product manager participating, in smaller companies the product manager may be responsible. In any case, getting reliable information on market and product on a frequent basis is part of the core SPM responsibilities**.**

From strategic management, product managers receive **guidance** that requires implementation or process execution in multiple areas:

- Strategic goals (e.g. entering certain market segments, objectives for market share or growth rate) and success measures and objectives, for example financial objectives (such as required profit margins or revenue goals)
- Portfolio management guidelines
- Innovation objectives
- Resource allocation rules and constraints
- Compliance guidelines

References: *Ebert, C., Dumke, R. (2007); McGrath, M. (2000); Porter, M. (1998); H.-B. Kittlaus (2022).*

EU2 Corporate Strategy

Duration: 1:45 h

Educational Objectives:

EO2.1: Know that there are many different schools of thought regarding what corporate strategy is and how it should be analyzed.

EO2.2: Know the strategy tools and approaches that are frequently used in today's software organizations so they can recognize those that are used in their own organization.

Corporate strategy is a relatively new phenomenon that entered the scene in the sixties of the 20th century. Mintzberg, Ahlstrand, and Lampel identified ten schools of thought in corporate strategy and classified those as prescriptive, descriptive, or integrative. Especially some of the earlier schools have developed approaches and tools that are frequently used in modern software organizations. Table 1 presents these frequently used approaches and tools, along with basic information on the schools they belong to. A complete list covering all ten schools is provided as Appendix A.

Table 1. Schools of thought in strategic management

School	Key assumptions	Authors	Examples of key approaches & tools
Design School	"Establish fit" – between internal capabilities and external possibilities; Design several alternative strategies (a creative act) and choose the best	Kenneth Andrews	**SWOT matrix** (internal **S**trengths & **W**eaknesses, external **O**pportunities & **T**hreats)
Planning School	"formal procedure, formal training, formal analysis, lots of numbers" replace the creative act of strategy design	H. Igor Ansoff, George Steiner	Elaborate planning cycles and schedules, **cascading systems of plans**; **Scenario planning**
Positioning School	Impact of industry structure on strategy: only a few positions in the market are desirable, and there are only a few generic strategies to select from	Michael Porter	**Porter's 5 forces** - for competitive analysis **BCG growth/share matrix** – for portfolio management (problem child, cash cow, star, dog);
Learning School	Strategies emerge as people (individually or collectively) learn about a situation as well as their organization's capability to deal with it. The leader's responsibility is not to preconceive deliberate strategies, but to manage the process of strategic learning.	Brian Quinn, C.K. Prahalad, Gary Hamel, Peter Senge, & many others	**Internal corporate venturing;**
Power School	Strategy formation is shaped by power and politics, both inside the organization and outside. The resulting strategies take the form of positions or ploys more than perspectives	Many, including Michael Porter	**Strategic alliances** **Strategic sourcing** - incl. make vs. buy and vertical (dis-) integration decisions;

However, not all approaches and concepts of the schools listed above may be relevant for software. For example, the positioning school also emphasizes the strategic importance of an industry's experience curve: unit costs fall as the aggregate number of units produced increases across the industry. This may lead to an obsession with achieving market leadership in terms of unit sales to achieve a cost leadership position. But following a strategy imperative that seeks competitive

advantage based on cost leadership in manufacturing is usually not applicable to software organizations. This is why the experience curve concept is excluded from Table 1, even though it is a key concept in the positioning school.

Product managers need to be aware of the strategy tools and approaches that are used in higher-level strategy processes in their own organization. By understanding which key ideas and assumptions are underlying the use of these tools and approaches, product managers can do a better job by:

- providing more useful input into strategy processes performed at higher levels in their organization and
- improved understanding of the guidance they receive from these higher-level strategy processes.

High-tech markets and the software industry have specific characteristics that led to the development of industry-specific models and tools that are used by Corporate Strategy initiatives in software organizations:

- Market Maturity Model for high-tech markets described by Moore: this model helps determine strategic focus areas depending on the maturity stages of the key markets in which the organization participates (see also EU4: Innovation Management)
- Software markets are often moving fast, resulting in fast value erosion – this usually leads to a strong emphasis on innovation management (see EU4: Innovation Management) and on making sure that the product portfolio stays fresh (see EU3: Portfolio Management)
- Software organizations often need to maintain a complex web of relationships to other players in the ecosystem(s) they participate in. In that case, deciding on the role the organization wishes to play in the ecosystem – keystone, dominator, or niche player – is typically part of Corporate Strategy (see “Ecosystem Management” in the FL Syllabus and in EL Product Strategy)
- Big data and analytics: in many cases, and in particular with SaaS software, software organizations can obtain detailed information on usage patterns and user behavior that helps making strategic decisions

References: *Mintzberg, H. et al. (2009); Mintzberg H. (2013); Moore, G. (2008); Kittlaus, H.-B. (2022, Ch.5.1)*

EU3 Portfolio Management

Duration: 1:30 h

Educational Objectives:

EO3.1: Know the meaning of portfolio management and how it relates to product management, i.e., portfolio management with a scope of several products and businesses, while product management looks to one product and its life-cycle.
EO3.2: Understand the three basic steps of portfolio management
EO3.3: Know how to contribute to portfolio management and use it.

Portfolio management is the dynamic decision process aimed at having the right product mix to implement a given strategy. Portfolio management consists of three steps, namely the extraction of information on the portfolio elements, the evaluation of these elements, and finally the decision in which elements to further invest. It addresses managing investment decisions over time following profit and risk criteria. To achieve this purpose, portfolio management concerns strategic information gathering and decision making across the entire product portfolio.

Portfolio management for software products follows the same basic methods and processes as any portfolio management. Based on a structured and transparent process, it balances limited resources in order to maximize benefits. Fig. 2 shows the three steps of portfolio management, i.e. extraction of information, evaluation of business and context, and execution of decisions. These three steps are adapted for software and IT portfolios – depending on their scope and whether the software products are stand-alone products (e.g., ERP system) or embedded into other products (e.g., car). Often the specific aspects of IT and software are insufficiently connected to business needs. In consequence, products fail due to priority conflicts, insufficient budget allocation and continuous changes. A key success factor for portfolio management in this context thus is to focus on software-specific aspects, while not forgetting the overall business environment, in which the software is embedded or used.

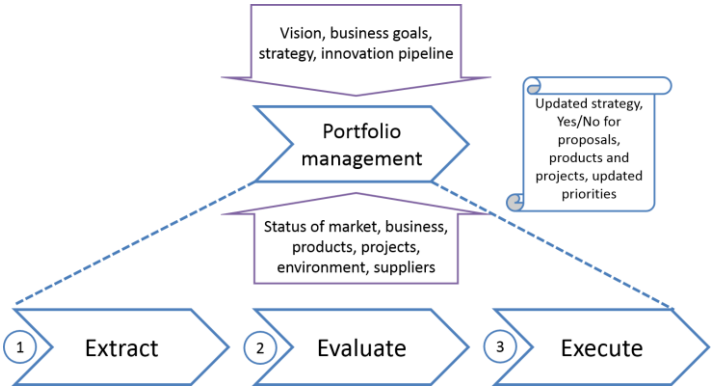


Fig. 2. Three steps of portfolio management from *Ebert and Dumke (2007),* Used with permission.

Portfolio management evaluates the entire scope of products and proposals with respect to their overall contribution to business success and addresses the question: Do we have the right products for future business success?

An integral part of portfolio management is also to stop some existing products by planning their withdrawal from the market. Portfolio management selects and decides on new proposals for new product evolution. A major output is the related allocation of limited resources such as people or money in order to the meet current and future business needs. As a part of resource planning, make, buy, or reuse decisions have to be made.

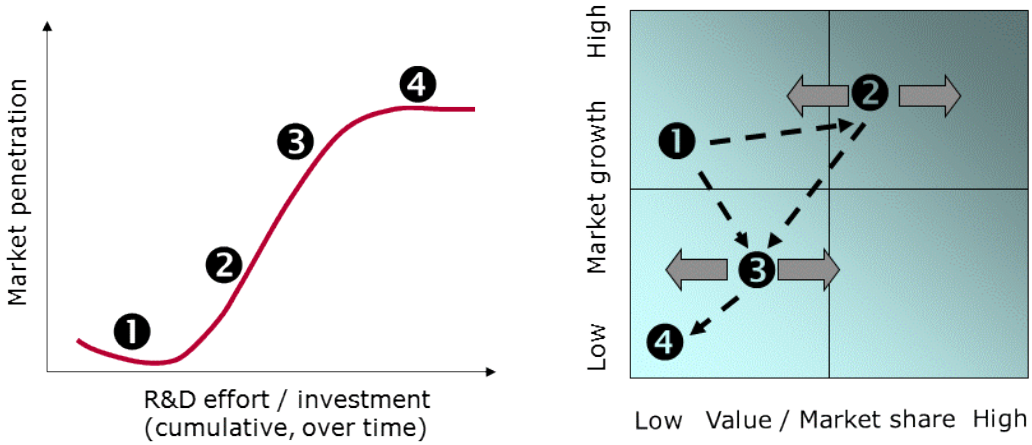
Portfolio management looks forward to current and arising opportunities and challenges. It relates closely to innovation management (see Fig.3) where proposals are made and eventually implemented – if positively decided by portfolio management.

Portfolio management optimizes the balance between products in an organization while product management optimizes the success of a single product and thus looks to one product and its life cycle.

Product management in an organization provides inputs for the portfolio management process and follows its decision subsequently. For example (and in the words of the BCG growth/share matrix, Fig. 3), a cash cow needs to get the necessary investment to keep it alive and successful, while stars need to be nurtured for continued growth, and dogs need to be stopped. The product manager uses inputs from portfolio management to better balance components, suppliers etc. on their decision-level (see Fig.3). For instance, product variants due to specific market and customer needs must be evaluated from a portfolio perspective to consider other related needs addressed by other products, including services.

The product manager needs to understand the relevance of their product in the company's portfolio and manage it according to business needs. Portfolio Management defines the business-oriented dependencies between different products. It positions the products within the portfolio and defines consciously which products should have certain overlapping functionality and for which products it is clearly wanted that they rely on each other to fulfill the total value. For example, services often rely very much on other products, and platforms and reusable components rely on a well-designed architecture. In such cases, decisions related to a platform product need to be decided on the portfolio level. This example shows the difference between portfolio management and product management. The first provides an outline of dependencies and business needs, while the latter implements the necessary actions to the roadmaps, feature catalogues, and product architecture.

Literature: *Benko, C.A. & McFarlan, W. (2003); Flyvbjerg, B. & Budzier, A. (2011); Ebert, C. (2012); Ebert, C. & Jones, T.C. (2014), Kittlaus, H.-B. (2022, Ch.5.2)*



1. Experiments (learning, investment, no payback, go/no-go)
2. Growth (value is growing fast, market positioning, invest)
3. Saturation (adapt / reduce investments, cash in profits)
4. End of life (high maintenance, decide / communicate end of life)

Fig. 3. Product lifecycle stage vs. BCG growth/share matrix from *Ebert and Dumke (2007)*, Used with permission.

EU4 Innovation Management

Duration: 1:30 h

Educational Objectives:

EO4.1: Know how to create an environment to foster innovation.
EO4.2: Understand how to choose and identify the right ideas and focus on ideas that matter.
EO4.3: Know how to refine ideas by testing, challenging and reframing ideas repeatedly.

Innovation is often realized in products in terms of new features or improved user experience, with the objective to bring more value to the users. But this is not the only type of innovation. Other types of innovation are related to how products are marketed, how current business models are changed or extended, or they aim at improving the internal organization and its processes.

Product managers are often dealing with and focusing on product innovations in terms of both new features, new quality aspects, or improved user experience. Furthermore, innovation can range from incremental improvements of the current product offering up to disruptive innovation that creates even new markets or replaces the way an existing customer need or customer problem is being addressed. One has to be aware that innovation also may leverage results from outside the company's borders by using the open innovation paradigm. This is a potential source of innovation for companies of all sizes.

A product category maturity model for B2B technology has been proposed by Moore to provide guidance how product marketing strategies need to change as a product category evolves from one maturity phase to another. The innovation focus changes depending on the maturity phase, e.g. application innovation is necessary for "crossing the chasm" while line extension innovation helps maintain and even grow revenue in a mature product category.

Creating innovation is a process of understanding problems, available technologies and creating the right ideas to bring them together. It is extremely difficult to order or formalize innovation processes. However, an environment can be created to foster innovation. An innovative culture needs to be established and fostered by management. Employees need to be encouraged to come up with ideas. They need to be allowed to test and validate ideas with potential customers, and a culture needs to be established in which it is acceptable for innovative attempts to fail without punishing or critiquing the employees, but rather learn from the failure.

While it is important to create an environment that fosters innovation, it is also important to have some gates within the company to select the most promising ideas and put some focus (and resources) on them or reject ideas for which the company may not have the right competencies to implement and is not willing to invest in building up the missing competencies. Overall, this is a challenging task within a company. On one hand, it is necessary to generate many ideas and give them a chance; on the other hand, it is important to focus on a few to bring them to success.

A great idea is normally never perfect at the beginning and requires many improvement and testing iterations before it matures. This refinement and testing process involves iterations of discussions with customers and the R&D team, creating incremental improvements that are best applied in prototypes, re-testing the concepts and challenging the value. This process typically combines an agile development process with customer collaboration. Driving the iterations is clearly the role of product managers. They act as facilitators to bring the customer demands together with the developer's solution and refine them until the value and user experience are optimal. Requirements triage, as described in the syllabus Excellence in Product Planning is a simple yet efficient tool in understanding which of the suggested ideas are the most suitable and promising. In this phase, it may also turn out

that the chosen strategy to achieve the vision is not appropriate. This leads to pivoting, which means the broader vision remains but a completely different strategy to get there is required.

Creating the innovative environment as well as the decisions which ideas to realize is the responsibility of management. Based on this, software product managers need to take advantage of such an environment, allocate time for researching new market opportunities, come up with ideas together with the broader product team, and prepare an initial business case to increase the odds of receiving funding and support for a project. This includes drawing the big picture about the result once the idea has been implemented. The business case needs to discuss potential benefits, both financial, as well as other benefits, such as improvements in the areas of user experience, customer satisfaction, or customer retention. A good selection methodology is the software value map (see *M. Khurum et. al (2013)*), as it incorporates many different value aspects for a structured decision.

Gathering this information supports management in making a decision, and also helps validate that the proposed innovation project fits into the overall corporate strategy. Once a project is approved or proceeds to the next gate, it is the product manager's responsibility to select the right users/customers to collaborate with. This is necessary to drive development teams to iteratively work on the project and get quick feedback from real users. These many validation steps ensure quick learnings and corrections before significant investments are made. It is also important that at every stage gate the progress is being presented and the predictions are being updated. The further advanced a project is, the more reliable the predictions of business impact will become. This is to ensure that should things turn out differently than projected, a decision can be made to either stop the project, re-align the project with the corporate strategy, or even to expedite the project.

References: *Kittlaus, H.-B. (2022, Ch.5.3); Cooper, R.G. & Edgett, S.J. (2009); Cooper, R.G. & Edgett, S.J. (2008); Khurum, M. et al. (2013); Miller, P. & Wedell-Wedellsborg, T. (2013); Moore, G. (2008); Ries, E. (2011)*

EU5 Resource Management

Duration: 1:15 h

Educational Objectives:

EO5.1: Know the key resources a product manager has access to.
EO5.2: Understand the product manager's role and responsibilities in relation to Resource Management.

Resource management ensures that the resources are available in the required quantities and qualities when needed so that the company is enabled to achieve its business goals and implement the agreed product strategies, aligned with the corporate strategy. A product manager may have access to resources such as product-related budgets, and people. Information access is also considered a resource because the product manager can use members of different departments or external consultants as a source of quantitative and qualitative information regarding the product and the market.

In some cases, product managers must make a request to the higher management every time they need extra resources for their product. However, a lot of friction and unproductive bureaucracy can be eliminated if product managers can base their product strategy and product planning on an available pool of resources, rather than having to deal with heavily fluctuating resource assignments and frequent resource request processes.

The product manager should be able to identify the key resources needed to deliver the proposed value proposition. Although this is not the core software product manager's responsibility, he or she should be able to critically evaluate whether the company has resources or can acquire/source them for developing the product/offering, building relationships with the customers, building distribution channels, achieving targeted revenue streams, building partners' and suppliers' network. Internal value analysis can be used as a tool to identify gaps between current key resources and needed key resources.

Resource management also includes recruiting external contractors and outsourcing available tasks. It allows the organization to temporarily fill resource gaps and manage the resource constraints. The role of product managers is to identify the resource gaps and constraints, and try to predict upcoming resources shortages, so that timely actions can be taken, such as recruiting, outsourcing, or informing higher management. However, hiring decisions are often made by higher management rather than the product manager.

References: *Kittlaus, H.-B. (2022, Ch.5.4); Maglyas, A., et al (2013); Peppard, J., & Rylander, A. (2006)*

EU 6 Compliance Management

Duration: 1:30 h

Educational Objectives:

EO6.1: Understand that software is not neutral from an ethics point of view, but like any technology, can be used and shaped in different ways that may be more or less ethical.

EO6.2: Understand how the Sustainability Awareness Framework can be used to determine potential effects of software systems on sustainability

Compliance means the act of obeying an order, rule, or request (Oxford Dictionary), in more detail:

On the legal side: implementing any relevant legal or regulatory requirements

On the non-legal side: acting in accordance with any relevant external or internal standards and guidelines, e.g. in the areas of sustainability or ethics

Compliance management means the management of the decision process, including which legal and regulatory requirements are relevant, and which non-legal standards and guidelines the organization wants to comply with. It also includes a governance approach that ensures that the defined compliance requirements are consistently implemented and audited in the organization. It may include participation in and/or influencing of defining external and internal rules, standards and guidelines.

Legal requirements that are often relevant for software are described in ISPMA SPM F (2022), Chapter 2.8, and in ISPMA SPM EPS (2022), Chapter 10.

To define their sustainability goals, organizations may use the "The 17 Goals" of the Division for Sustainable Development Goals (DSDG) of the United Nations as a starting point (United Nations 2015).

Since the mid 2010s, ethics related to software has seen renewed interest. This has been sparked for example by questions regarding the impact of social media on the well-being of individuals and on the outcome of political decisions. Another area that gets some attention is the increasing use of algorithms and Artificial Intelligence (AI) for making important decisions in business, such as loan or hiring decisions, and even in government, for example within police forces.

Bowles (2018) provides a comprehensive overview of areas where those who shape software products, including software product managers, need to consider and answer ethical questions.

Key areas for software ethics include

- Algorithmic bias
- Use of "persuasive" mechanisms, nudging, or approaches to make software more "sticky" (i.e. to increase user engagement)
- Fairness in using data of users, including new types of personal data generated through computer vision and listening, e.g. from voice assistants or cameras embedded in cars, or from smart devices in the home, or health and fitness trackers
- Moderation and free speech, e.g. on social media platforms
- Ethics in conducting A/B tests, e.g. using children as study subjects, or running studies to measure the impact of changes in the software on the well-being of subjects
- Environmental impact of software, e.g. taking carbon footprint into account when deciding between different solution approaches for a certain requirement

Due to the black box nature of many recent artificial intelligence (AI) technologies, their use raises specific ethical questions – even more so when AI is used in autonomous systems. Therefore, organizations developing AI-based software need specific AI ethics guidelines. In 2020, Balasubramaniam et al. conducted a case study with three companies from Finland that already have

established AI ethics guidelines. The authors identified the following common ethical issues of AI (in alphabetical order): autonomy, anonymity, fairness, privacy, safety, security, transparency, and trust. They researched to which extent and in which way these issues are addressed in the AI guidelines of the three case study companies. The authors suggest that "… organizations develop and use ethical guidelines to prioritize critical quality requirements of AI."

It is the responsibility of the software product manager to ensure their software product is aligned with company guidelines from compliance management. This alignment may have significant consequences for the software product, for example it may impact product definition or lead to additional product requirements.

In 2019, Duboc et al. presented the Sustainability Awareness Framework as a tool to be used in requirements engineering. The framework consists of a diagram to raise awareness of the potential effects of software systems on sustainability (Sustainability Awareness Diagram, SuSAD), plus a questions framework to guide semi-structured interviews. The SuSAD represents the impact of a software system on five sustainability dimensions: social, individual, environmental, economic, and technical. The questions framework provides interview instructions and question sheets with targeted questions for each of the five dimensions. Special emphasis is put on eliciting chains of effects and using imaginary extreme scenarios to make interviewees consider long-term, compound impacts of the proposed software system.

Beyond just aligning with company guidelines, the areas of compliance and ethics also present opportunities for differentiating a software product. For example, the product manager may propose to exceed legal and regulatory requirements in the areas of data protection or protection of minors, or to be more transparent than competitors regarding the inner workings of sensitive algorithms used by the product.

Literature: *United Nations (2015); Bowles, C. (2018); Balasubramaniam, N., et al. (2020), Duboc, L., et al. (2019); ISPMA SPM F (2022); ISPMA SPM EPS (2022); Kittlaus, H.-B. (2022, Ch.5.5)*

EU7 Market Analysis

Duration: 2:00 h

Educational Objectives:

EO7.1: Understand the essentials of market analysis.
EO7.2: Know the activities that belong to market analysis.
EO7.3: Understand the role of a product manager in relation to these activities.
EO7.4: Know where to find information sources relevant to market analysis.
EO7.5: Know how to document results of the market analysis.

The goal of a market analysis is to determine the characteristics of both current and future markets. Organizations evaluate the attractiveness of a future market by gaining an understanding of evolving opportunities and threats as they relate to that organization's own strengths and weaknesses. A market is not limited to existing customers, but it also includes potential future customers or new market opportunities. In the Blue Ocean Strategy framework, a metaphor of red and blue oceans describes the market environment: the red ocean represents the current, highly contested markets, the water is red from blood because of the cut-throat competition. The blue oceans represent newly created market opportunities. The vendor creating these new opportunities (initially) has no competition, and demand is created rather than fought for (therefore, no red blood).

To conduct a market analysis, a product manager or a market research specialist should collect the information about market and industry forces and key trends:

1. Market Forces
    a. Market issues: Identify key issues driving and transforming your market.
    b. Market segments: Identify major market segments, describe their attractiveness and seek to spot new segments.
    c. Needs and demands: Willingness to pay: Identify and describe for which features customers are willing to pay.
    d. Outline market needs and describe how well they are served.
    e. Switching cost: Describe the cost factors customers are facing when they switch to a competitive product.
2. Industry Forces
    a. Competitors (Incumbents): Identify incumbent competitors and their relative strengths.
    b. New entrants (Insurgents): Identify new, insurgent players and determine whether they compete with a business model different from yours.
    c. Pricing: Identify price structures and levels prevalent in the selected market segments.
3. Key Trends
    a. Technology trends: Identify technology trends that can threaten your business or enable it to evolve and improve.
    b. Regulatory trends: Describe regulatory trends that may influence your business.
4. Quantitative data about the market to support the qualitative analysis
    a. Market size
    b. Competitor’s revenue, profit, market share (analysis of the annual reports, if available)

This information cannot be collected by product managers alone, but it also requires involvement of marketing, sales, and possibly external consultants, in particular market research agencies. In larger companies, there may be internal market research specialists or product marketing managers who provide the information to product managers on a regular basis.

Defining a market is central for market analysis and helps to better understand the customer. There are several different segmentation models available, one of them being the Three Level Model (Fig. 4). A key benefit of this model is the balance that can be achieved between myopia (too narrow segment definitions) and mass market (too broad definition):

- LEVEL 1 – RELEVANT MARKET
    - Define Geographic Trade Area = current market served
    - Define Product Market = current products offered (myopia)
    - Define Generic Market = mass marketing definition (mass market)
    - Relevant Market = Larger than Product Market / Smaller than Generic Market

Fig. 1. LEVEL 1 – Relevant market

- LEVEL 2 – DEFINED MARKET
    - Defined Market = Relevant Market segmented into penetrated market (existing customers) and untapped market (non-customers)
- LEVEL 3 – TARGET MARKETS
    - Apply Segmentation Dimensions to Defined Market
    - Identify Multiple Segments within Defined Market
    - Select Attractive Segments within Defined Market

The market analysis results should be used in a number of activities of software product management, in particular product positioning, business aspects, ecosystem management, and roadmapping. The market analysis needs to be documented both as text and figures useful for market segmentation, trends, and quantitative information.

Literature: *Kim, W.C., Mauborgne, R. (2015); Osterwalder, A. & Pigneur, Y. (2013); Weinstein, A. (2013); Kittlaus, H.-B. (2022, Ch.5.6)*

EU8 Product Analysis

Duration: 1:30 h

Educational Objectives:

EO8.1: Understand the task of product analysis.
EO8.2: Understand the data and metrics used for product analysis in different phases of the product life cycle.
EO8.3: Understand the relationship of product analysis to other strategic tasks and to other corporate functions.
EO8.4: Know how to documents the results of product analysis.

Product analysis seeks to achieve a holistic view of the history and current state of technical and business performance of a specific product and the software-related services around it. The result of product analysis gives a comprehensive overview of the internal and external product status regarding the number of customers, cost, revenue and e.g. the situation in support and maintenance. Looking at product analysis results, a product manager should be able to compare actual product achievements compared to the plan and make appropriate actions if serious deviations occur.

Carefully selected and properly evaluated Key Performance Indicators (KPIs) complemented with qualitative information should be used to monitor a product's performance

- Financial KPIs focusing on the history, current state and plan for:
    - Cost of the product (development, maintenance and support or third-party license fees, patent license fees). This information usually comes from the finance and controlling organization.
    - Revenue as well as the existing pipeline of potential customers is analyzed (license, subscription, maintenance and support revenue). This information should come from the sales and finance and controlling organizations.
    - Profitability, for which product related cost are subtracted from product related revenue.
- Customer-related KPIs focusing on the history, current state and plan for:
    - The absolute number of customers and end users including growth rates and market shares (from Market Analysis). This can also be used for analyzing customer retention in the later stages of the product's life cycle.
    - The maintenance situation in terms of total number of customers, number of releases in maintenance und number of customers per release. This information usually comes from the support organization.
    - The quality situation in terms of number of support incidents and customer escalations per release. This information usually comes from the support organization.
    - Customer satisfaction can be evaluated through some metrics or based on qualitative analysis.
- Development-related KPIs focusing on history, current state and plan for:
    - Quality during the development process and its relationship to customer-perceived quality (see above).
    - Productivity of the development team.

  Some development organizations tend to consider this data as internal, but a product manager needs to look at this data at least on a summary level.

- Product-usage-related information and KPIs:
    - For licensed software products where the runtime environment is under the responsibility of the customer, runtime measurement is usually limited and may require the customer's agreement.
    - In an internet environment like Software-as-a-Service (SaaS), measurement is easier, since software and runtime environment are both under the same company's responsibility. This includes web analytics measuring, click rates, and analyzing visitors as well as detailed monitoring how users interact with the software. Some internet companies use customer discovery to test the user acceptance of new features.

Product Analysis has different foci in the different phases of the product life cycle, as shown in Table 2.

Table 2. KPIs in Life Cycle Phases

Phase	Focus of product analysis
Conception and creation	Financial KPIs for planned data, Development-related KPIs
Market introduction	Product-usage-related KPIs based on planned and current data, Financial KPIs for planned and current data, Development-related KPIs
Growth	Customer-related KPIs, Financial KPIs, Product-usage-related KPIs, Development-related KPIs
Maturity	Financial KPIs for current data, Product-usage-related KPIs, Customer-related KPIs, Development-related KPIs
Decline	Customer-related KPIs, Financial KPIs, Development-related KPIs
Withdrawal	Financial KPIs for historic and current data

The product analysis results are used in a number of activities of software product management, in particular business aspects, performance management, life cycle management, roadmapping, release planning, and product requirements engineering. These results should be comprehensively documented with both text and associated graphs for showing the trends over time.

Literature: *Buse, R.P.L. & Zimmermann, T. (2012); Buxmann, P. et al. (2011); Gottesdiener, E. (2012); Kumar L. et al. (2012); Kittlaus, H.-B. (2022, Ch.5.7)*

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This literature has been used by ISPMA as the scientific basis for this syllabus. It is not required reading for course participants.

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Appendix A: Schools of Thought in Strategic Management

All 10 schools of thought, based on: *Mintzberg H., Ahlstrand B., Lampel J. (2009).*

Table 3. Schools of thought in strategic management – The Big 10

School	Key assumptions	Authors	Key approaches & tools
Prescriptive – how strategy *should* be formulated: strategy precedes structure			
Design School strategy formation as a process of *conception*	"Establish fit" – between internal capabilities and external possibilities; Design several alternative strategies (a creative act) and choose the best	Kenneth Andrews	**SWOT matrix** (internal **S**trengths & **W**eaknesses, external **O**pportunities & **T**hreats)**;**
Planning School strategy formation as a *formal* process	"formal procedure, formal training, formal analysis, lots of numbers" replace the creative act of strategy design	H. Igor Ansoff, George Steiner	Elaborate planning cycles and schedules, **cascading systems of plans**; **Scenario planning**
Positioning School strategy formation as an *analytical* process	Impact of industry structure on strategy: only a few positions in the market are desirable, and there are only a few generic strategies to select from	Michael Porter	**Porter's 5 forces** - for competitive analysis; **BCG growth/share matrix** – for portfolio management (problem child, cash cow, star, dog); Experience curve => focus on market leadership; **Generic strategies**: cost leadership, differentiation, focused strategies; Value chain analysis
Descriptive – understand strategy *as it unfolds*			
Entrepreneurial School strategy formation as a *visionary* process	Strategy exists in the mind of the leader (entrepreneur) as a vision, strategy formation is rooted in experience and intuition of the leader; often starts in niche market	Schumpeter (creative destruction)	Vision statements
Cognitive School strategy formation as a *mental* process	Strategy formation as a cognitive process that takes place in the mind, creating perspectives that shape how people deal with input from the environment	Many different sub-schools and authors	Tools to help managers/ leaders better understand their cognitive biases and their personal preferences, e.g. by doing a Meyers-Briggs personality test
Learning School strategy formation as an *emergent* process	Strategies emerge as people (individually or collectively) learn about a situation as well as their organization's capability to deal with it. The leader's responsibility is not to preconceive deliberate strategies, but to manage the process of strategic learning.	Brian Quinn, C.K. Prahalad, Gary Hamel, Peter Senge, & many others	**Internal corporate venturing;** Learning organization
Power School strategy formation as a process of *negotiation*	Strategy formation is shaped by power and politics, both inside the organization and outside. The resulting strategies take the form of positions or ploys more than perspectives	Many, including Michael Porter	**Strategic alliances** **Strategic sourcing** - incl. make vs. buy and vertical (dis-) integration decisions; Stakeholder analysis; Strategic maneuvering - in response to competitors

Cultural School strategy formation as a *collective* process	Strategy formation is a process of social interaction, based on the beliefs and understandings shared by members of an organization	Several sub-schools	Strategic resources
Environmental School strategy formation as a *reactive* process	Leadership is a passive element for reading the environment and ensuring proper adaptation by the organization	Various authors and sub-schools	--
Integrative			
Configuration School strategy formation as a process of *transformation*	Organizations are stable most of the time, but occasionally, they need to transform – take a quantum leap to reach another configuration. Strategic management needs to sustain stability most of the time, but recognize the occasional need for transformation and manage it without destroying the organization	Many, including Mintzberg	Change management