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AN ESSENCE OF PORTFOLIO PLANNING IN THE SOFTWARE DEVELOPMENT INDUSTRY

Abstract: Companies in the software industry are mostly fast growing organizations. Together with the fast growth comes the loss of transparency and problems with structures where projects become their own dynamic and importance, even if other projects might be more important for the customers and the company's goals. Portfolio Planning (PP) describes the important first step of portfolio management in the software development industry. The process links the investment opportunities with the global strategy of the company. Furthermore it provides the necessary tools and taxonomy to break down the vision into small work packages that can be realized in development projects. Different roles and responsibilities are described for PP which is a highly communicative process with the necessity of cross company alignment on different levels.

Keywords: portfolio planning, investment decision, life cycle, corporate strategy, planning process, investment cluster.

1. Introduction

World leading software development companies like SAP AG, Germany, have worked in the last years on a concept of perfectionalization of their methodology to improve their strategic planning approach with its impact on processes, tools and people.

The presented concepts are based on the author's experience with an insight view on SAP. The author has been working for SAP for more than 8 years. He was also in charge of defining, implementing and introducing different processes and tools to drive Portfolio Planning. The developed approach of Portfolio Planning at SAP in the timeframe from 2005 until 2008 is described in the paper.

The goals of this paper are to discuss the differences between the classical Life Cycle Management Model (LCMM) and Portfolio Planning and to analyze the Portfolio Process at SAP.

The growth particularly in this industry makes this industry very unique. SAP started on April 1, 1972 with a few employees [Meissner 2001]. After 10 years of

existence SAP had 100 employees. In 1988, before the Initial Going Public (IPO), SAP grew to about 1000 employees. Today the number of employees circles around 48,000 people with a turnover of 10.7 billion euro in 2009 [SAP 2010a, b]. This huge growth is based not only on direct recruitments, but also on large mergers and acquisitions (M&A). The growth within a very short period of time resulted in the loss of transparency, caused by the high revenues in the past, which were higher than the costs. Around 2001, when the new economy bubble collapsed, which cost many subjects in the market a lot of money, also SAP was still growing, but the growth of revenues in new business opportunities was smaller. One other aspect was the development driven investment decision of the company. SAP had a very high impact and success with the products of SAP R/3 and the integration of processes around large companies. This made the management of development areas in the complex organization politically very strong and together with the fact that SAP had a lot of earnings and revenue led to the situation in which often the development rolled in many new projects and investment decisions for the company. The board had to decide about the investments, but they received the information from the management of development. The board was open for external influences due to the missing overall view. SAP is a company with a future approach in terms of the globalization of solutions and highly distributed knowledge utilization. The missing link between the solutions and the knowledge are the missing supporting processes and tools [Owoc 2003].

Other pain points in the yearly planning rounds were the missing link of projects to the global strategy. Due to missing guidelines it was not possible to compare information between business units. Also the approval process was not aligned in the organization. This made it almost impossible to create a balanced and prioritized portfolio. Synergies could not be used and cause the reinvention of software which has already been developed in other business units. Missing alignment between roles and release cycles caused resources to become bottlenecks. The capacity was not transparent due to the lack of unified decision bodies across programs and solutions. This caused a situation that the budget has been assigned to business units according to the assigned employees; a funding of business opportunities did not directly take place. Further pain points were unnecessary projects that were just working because they have been initiated in the past and not revaluated anymore.

The implementation of Portfolio Planning provides a solution for SAP and other companies in the software development industry to have a roll in process for ideas, aligning them with the company's strategy and to develop a portfolio for one year.

2. Portfolio Planning versus the Life Cycle Management Model

Every company in the software development industry has a Life Cycle Management Model (LCMM) which describes the process of software development with different phases, milestones and deliverables [Kunz 2007; Lang 2009; Stockstrom 2010].

The focus on the LCMM describes the process for one product, application or program. The model is not able to handle the complexity of different development areas. Development areas can have two different views, because in one case they are suppliers and in the other case they can be demanders of software or services. Portfolio Planning brings the different views of supply and demand together and enables the overall strategy of the company to be implemented in the programs and applications. The prerequisite is to have the complete overview on the organization. This includes the current development areas with the applications that are under development. To be able to link the portfolio to the organization, it is required to have a reliable picture on the figures of available resources in headcounts. In case of missing internal resources it is common practice to invest budget for third party, to be able to buy the necessary resources on the market. The view on the skills of the people is not relevant for the high level view of Portfolio Planning. The relevance of Portfolio Planning is to prepare wise investment decisions, to align with Human Resources (HR) if the coverage of headcounts is available, and receive the commitment from development on architectural and time-based feasibility of the requirements. Portfolio Planning with the phases Invent, Define, Develop, Deploy and Optimize is the framework for the integrated LCMM. The LCMM will be used at a project level in the development with a higher detail view as an instrument to set-up, lead and track the projects according to standardized rules.

3. Objective of Portfolio Planning

Portfolio Planning is a revolving process which prepares to make wise investment decisions, to track the single entities and to monitor the whole process [Bennett 2010]. In the software development industry the product in the portfolio is the software that has to be developed in the next cycle, mostly one year. The software can be categorized in new functionalities, maintenance and service base load.

Contrary to other industries, the development of software is the main purpose of the company. In other industries the software applications are necessary to support other departments. The application portfolio has also to be aligned with the available resources and the budget situation in a highly communicative and cooperative process. The same factors influence the portfolio, preparing financial decision in alignment with the strategy, managing the risks, controlling the execution, adapting the portfolio in a change management process to actual requirements.

The overall objective is to maximize the return and to achieve financial goals, therefore it is necessary to properly and efficiently allocate scarce resources. Integrate central processes as Portfolio Management and Portfolio Planning are strongly dependant on centrally guided processes [Bennett 2010]. The deliverable for making the right business decisions is to create a high level capacity overview for currently allocated releases and for the new investment opportunities. At the end

of each yearly Portfolio Planning Cycle the objective is also to have the complete budget that is necessary to run the departments.

4. Approach of Portfolio Planning

Portfolio Planning is as part of Portfolio Management a strategic component of corporate governance, based on the company's objectives. This strategic component is directly aligned and connected with the strategy management and the vision of a company with a long-term view [Hoffmann, Schmidt 2010]. The focus of the strategic portfolio is the view on the company as a whole [Stockstrom 2010]. The strategic view has a timeframe of 3-5 years. This is also covered by the Portfolio Planning process with a focus on the next planning period of one year.

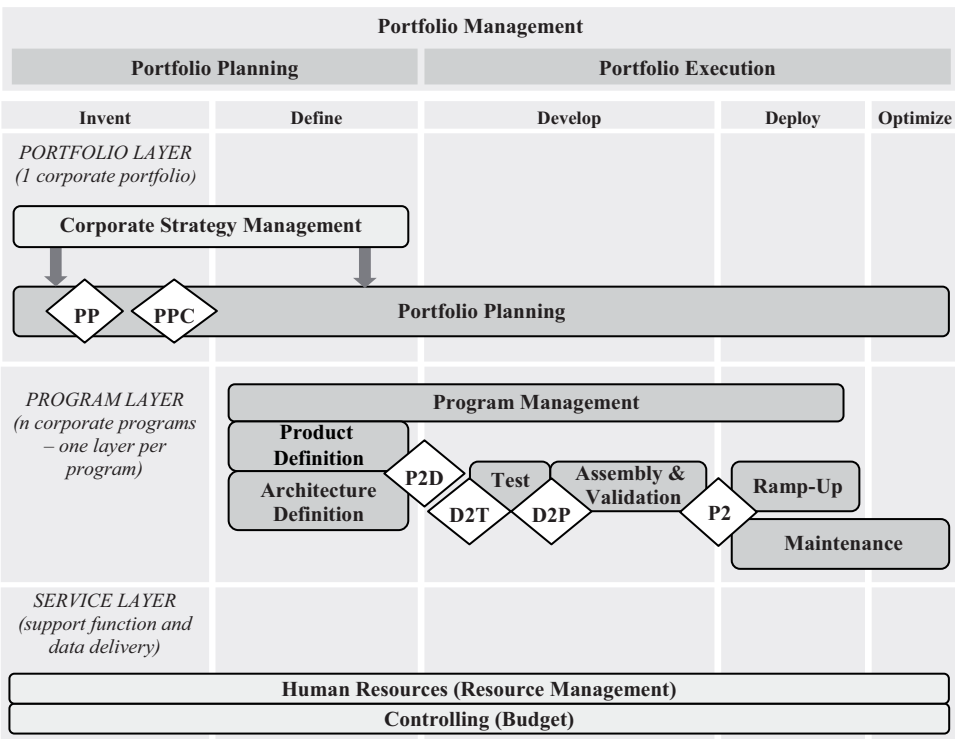

Figure 1. Milestones and interactions of Portfolio Management

Portfolio Management is a notion derived from Financial Management of financial portfolios. The objective is in both cases the same, to wisely manage a product portfolio to secure investments and to minimize the risk of financial losses. Portfolio Management accompanies the whole development process from the

invent phase to deployment and optimization of software products. The focus here is on Portfolio Planning that happens in the invent and the define phase (Figure 1). It enables a better comparison of ideas and projects – and an established choice. Important for this process are the following KPIs: Net Present Value, Strategic Value, Risk Value, ROI (Return of Investment), Planned Values (Capacity, Financial). The Portfolio Execution is based on the results of the Portfolio Planning.

The structured analytical approach requires to start the Portfolio Planning process with an aligned portfolio guidance conducted from the central operations team and the corporate strategy group. The portfolio guidance represents the vision of the company as an outcome of the corporate strategy management [Hoffmann, Schmidt 2010; Stockstrom 2010]. The guidance has to be aligned with the major stakeholders and signed off by the solution management of each development unit, as it bundles the foundation and the boundaries of Portfolio Execution. This ensures the same understanding on a high level.

The portfolio guidance includes the company's 3-year strategy, specific guidance, given portfolio priorities, the 3-year solution roadmap (wish-list) and a quantitative guidance.

Investment Clusters are the logical link of topics. They contain the definition of the high-level scope, the estimated 3rd party budget, the cluster owner who is part of the top management and the cluster stakeholder. The cluster stakeholder ensures the representation of applications and industries. The involvement of the top management, department heads, solution management heads of each business unit as well as corporate controlling is crucial for the success of the alignment. This approach assures to avoid the mistakes of the past and to prepare decisions with the full picture of all investment clusters. The Investment Cluster owner is accountable for collecting, evaluation and prioritizing Investment Opportunities which best fit into the Investment Cluster according to the top-down guidance. The Investment Cluster owner is also responsible for managing the planning process in time with high quality.

The Investment Clusters are still on a very high level of definition. To collect more detailed information and to be able to discuss on a more detailed level, the Investment Clusters have to be broken down into *n* Sub-Clusters which represent the single investment opportunities. To assure the accountability on this level, each Sub-Cluster has to be assigned to owner. The owner is responsible for establishing an overall Investment Cluster Business Case to deliver the required data for the Portfolio Planning Council at the end of the invent phase, where it needs to be presented and signed off. The Investment Cluster owner is a member of the solution management team and therefore also in charge of involving the stakeholders throughout the whole process. This step pictures the changes from the formerly development-driven investment decisions to the decisions prepared by solution management.

The topics of Investment Cluster and Investment Opportunities can be differentiated into topics concerning one single unit and into cross-topics (Figure 2). The cross-topics need the involvement and the alignment with other business units.

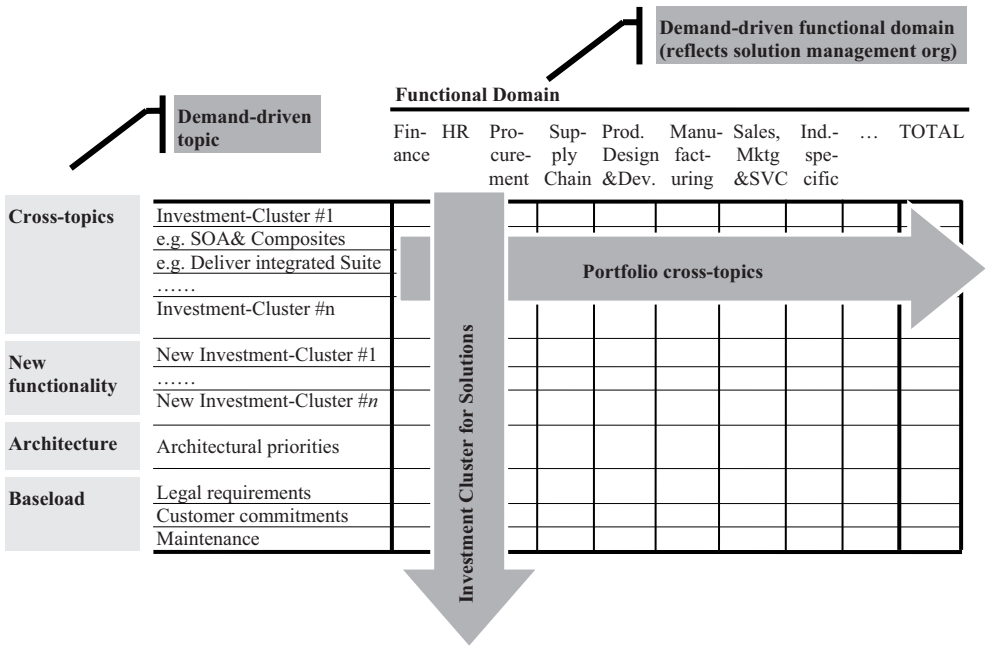

Figure 2. Portfolio priorities along two dimensions

The approach of Portfolio Planning is a top-down approach in the first step to collect all business opportunities and to prioritize the portfolio. Later in the process the detailed content and estimations will be evaluated by development with the bottom-up approach. The collection of topics here is demand-driven and needs a high communication effort to align the required demand from other business units in case of cross topics. The complete picture of all high level demands and the accepted supplies will be delivered by the central operations team.

Three different types of the Sub-Clusters can be distinguished:

1. Multi-year Sub-Clusters – Investment Opportunities that go over several years or releases require a precise business case. The effort estimation needs to be precise in the overall effort and the effort for the next year/release, the split of the remaining effort to the next years/releases may be rough.

2. One-year Sub-Clusters (a), which will be delivered in the first year of the 3 year planning horizon, require for a precise business case (including revenue planning and effort estimation).

3. One-year Sub-Clusters (b), which will be delivered in the second or third year of the 3-year planning horizon, require a rough business case (including revenue planning and effort estimation). The business case will be updated in the planning cycle prior to the planned delivery year of the Sub-Cluster.

For a transparent overview on the required high level budget, each Sub-Cluster needs to determine the estimated budget. The comparability between different business units is given by the same definition to calculate budget and capacity. The budget is an aggregation of the calculated required person days for implementation (including the person days required from other supplying business units), required 3rd party budget and travel expenses. The outcome is the high level budget containing all relevant aspects of the implementation. The common approach is to calculate the required person days for the core development including the development tests. Afterwards, to receive the complete picture on the required budget, the subsequent efforts for supporting units will be calculated based on the development efforts. The development effort is multiplied with a separate factor for each supporting unit. Supporting units are Quality Management, solution management, Knowledge Management and Translation. The ramp-up unit is founded separately and is counted as fix costs of the corporation; therefore it can be excluded from this view.

3rd party budget is necessary for the cases where the internal resources in the organization are not enough in terms of headcount or skills to implement the planned contents. The calculation of available person days is based on the assumption, that each Full-Time-Equivalent (FTE) provides 192 available working days per year. Part-time employees are calculated on this basis, e.g. an employee with an 80% contract contributes with 153 person days to the available amount of capacity for the business unit he is assigned to.

The travel expenses are important for a globally acting company, even with the state-of-the-art technology for video conferencing, telecommunication and supporting computer systems. The costs for travel can be reduced with stronger travel policies, but they will always be a cost factor which has to be planned and estimated to avoid an under coverage. The travel costs are summed up for each business unit on the basis of the assigned Sub-Clusters. This enables a direct reporting on the Sub-Clusters, which becomes mostly important in the Portfolio Execution phase. The holistic view on the total costs requires to include travel costs within the development.

Portfolio Planning is a complex process with a highly interactive character. The demanding units have to align the requirements with the supplying areas and receive their commitment on the delivery. The alignment happens in multiple offsite meetings with a central escalation path. The planning happens on a very high abstraction and political level. The technical details are not relevant at this stage. More important than the technical detail is the alignment of the Sub-Clusters with the field as they are close to the market and know about the expectations from customers. The field delivers for each Sub-Cluster the validated field revenue which can be expected if the Sub-Cluster is implemented and sold with the Software.

The Investment Cluster owner together with the stakeholder run a first prioritization to probably reduce the number of Sub-Clusters using the qualitative information and the first rough effort estimation. It is also required to bring the first results together with all other Investment Clusters to identify redundancies and to

detect synergies. This is one of the desired advantages of the transparent process. All Sub-Clusters will be tagged with either “proceed” or “not proceed”. No Sub-Cluster will be deleted as it could be the input for the next Portfolio Planning cycle.

At the end of the invent phase after the first step of the Portfolio Planning, the second step follows with the Portfolio Planning Council (PPC). Before prioritization of the portfolio happens in the Portfolio Planning Council, the business opportunities just have the character of items on a wish list. For this top management meeting it is required that all relevant data of all Investment Clusters and their Sub-Clusters are available. The completeness of information is relevant as the PPC decides about the priorities of the planned investments. The highest priorities have those Investment Clusters which are based on direct customer commitments, maintenance and legal requirements. Corporate controlling delivers for the PPC the total available budget for the planning period. After prioritization of the Investment Clusters, the available budget builds a cutting line which determines which opportunities are funded and which cannot be implemented due to missing budget.

The corporate portfolio contains the final list of prioritized Investment Opportunities per Investment Cluster. All attributes are completed, including the detailed business case description, the field validated revenue, ramp-up customers, detailed scope description and the effort. Also the 3-year solution roadmap is part of the Investment Cluster. The balanced demand and supply view on committed efforts by development unit have to be delivered.

After finalizing the single corporate portfolio with the milestone of PPC, the Program Management of each program becomes active. This is the start of the detailed planning of the product definition led by solution management as well as the architecture definition led by development management. The joint objective in Product Definition and Architecture Definition is to describe and to align the details including the technical details of each program.

The taxonomy of Portfolio Planning Elements in Figure 3 is relevant for the handover to solution management. The defined phase prepares the execution of development. Therefore it is necessary to break down the Sub-Clusters in work packages which can be handles in Development Projects. Therefore solution management first transfers the Sub-Clusters into Portfolio Cases. A Portfolio Case is a picture of the Sub-Cluster enriched with more market data. It provides the opportunity to break down the Sub-Cluster in 1:*n* Portfolio Cases if necessary. Mostly the Sub-Clusters can be transferred to Portfolio Cases with a 1:1 relationship.

In the next step solution management breaks down the Portfolio Cases into Portfolio Case Items. The Portfolio Case Items are an interface between solution management and Architecture. Despite the fact that Architecture was already involved in the first rough estimation on Investment Cluster and Sub-Cluster level, now Architecture needs to create the estimation with a much higher precision. This is only possible with providing a more detailed structure. Therefore the estimation for developing a functionality of a Portfolio Case Item is calculated out of the sum of Scope Items. The Scope Items are the elements with the highest granularity.

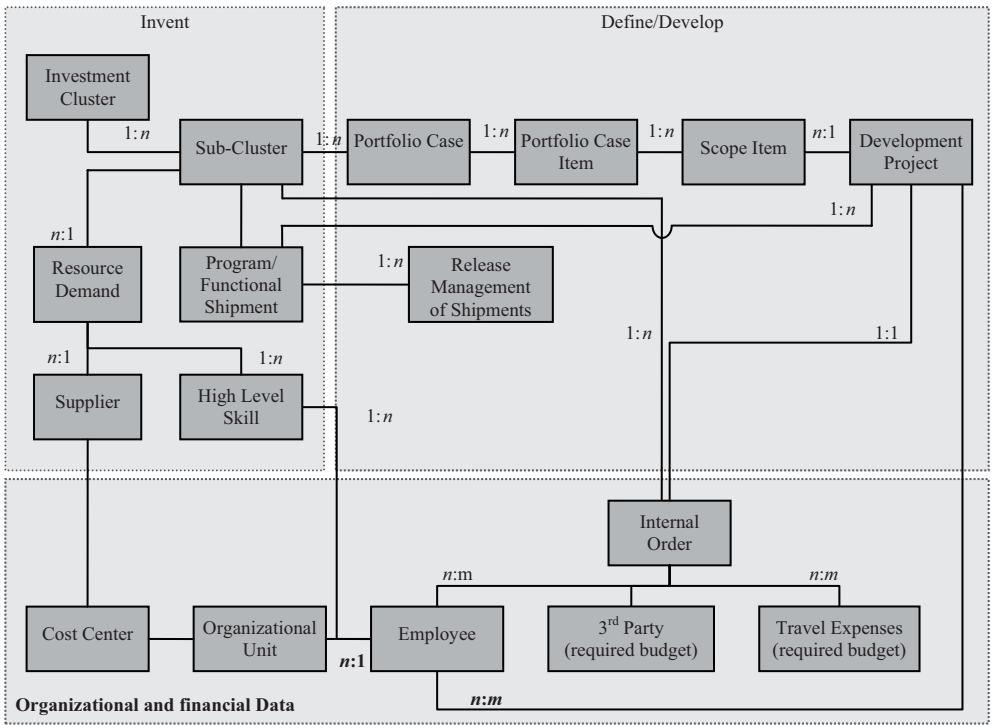

Figure 3. Taxonomy of Portfolio Planning elements

The following example provides an impression on the planning granularity:

– 1 of 50 Portfolio Cases – "Provide new Business Suite to the Market" → 20.000 Person Days
- 1 of 15 Portfolio Case Items – "Create new Billing Engine for the Business Suite" → 3.000 Person Days
- 1 of 200 Scope Items – "Implement Database Changes for Application XYZ" →10-50 Person Days

The Scope Items are defined together with Architecture and Development. This provides the same understanding of the content and directly prepares the commitment of development to the estimation. Contrary to the top-down approach in the Invent phase, the Define phase uses the bottom up approach to enable the alignment and commitment from development.

The Scope Items will be assigned from Development to Development Projects. One Development Project contains many Scope Items, but one Scope Item is realized in just one Development Project. The advantage of the structure together with redundancy checks on Scope Item level is to ensure that a functionality is developed one time only. The synergy becomes effective if the functionality is needed in other Portfolio Case Items as well. The Development Project with all assigned Scope

Items is handled in one assigned shipment, which is in the responsibility of Release Management.

To provide a sufficient reporting in the Portfolio Execution, the staffed developers report their efforts in a central system. They use Internal Orders which are assigned uniquely to Development Projects. The Internal Order is also the leading criteria for the assignment of 3rd party and travel expenses to Development Projects. The structure of Internal Orders provides the possibility to track back each development activity from the Development Project up to the Investment Cluster. This builds the architecture for a transparent reporting of status, costs, budget, resources and quality.

The following phases in development, deployment and optimization with the according milestones Development to Test (D2T), Development to Production (D2P) and Development to Ramp-up (D2R) are standard processes in the LCMM, necessary to deliver the realized software packages to the solution management as their customer. Along the standard development process of Portfolio Execution, the monitoring and controlling of the Scope Items gives a transparent view on status and quality.

The execution tracking starts after the PPC with Development Forecast Meetings. Part of those meetings are commitment monitoring, change requests for Investment Clusters at any level, reprioritization of elements, facilitation of decisions for new business cases, facilitation of issue resolution in development programs.

5. Limitations of Portfolio Planning

Portfolio Planning is an instrument which can provide the transparent and balanced portfolio for a company in the software industry. This requires a high quality of input for the single process steps from each participant. This builds simultaneously the limitation of the Portfolio Planning process. Providing the management with wrong data can mislead it to make wrong decisions. The reason for providing wrong data is based on different human factors, with has different reasons. First, it is possible that the provided guidance and rules for collecting data are understood in a wrong way by different departments, which results in data collected with different methodologies. This makes the results unusable. The danger is that people think that they understood the approach, even if they did not. Another human factor and the more dangerous one is the political power play which can be found particularly in big companies and organizations. The structures in those companies are multiple and not visible but they exist. The human being tries to make the best out of a given situation. Here the managers are working in a structure of power which they try to influence. The most important factors to show the power and to compare the power with other managers are given by the number of lead people and the supervised budget. Both factors are part of the Portfolio Planning process which provides the corporate result for the next year with a forecast of a 3-year horizon.

The human factor can also limit the process of Portfolio Planning because the provided transparency though the process and the alignment with other areas is sometimes not wanted. The hiding of information can become a big problem in large organizations and costs a lot of money by not using synergy effects.

Conditions for a successful Portfolio Planning inter alia (own elaboration):

- clearly defined and communicated corporate goals/strategies,
- clearly defined and communicated processes,
- defined areas of responsibility,
- accountability of participants,
- guidance of the participants,
- effective resource-/cost-/time-planning,
- full data- and document-management,
- clear commitment of the development to the defined Scope Items,
- facing the fear of change of people for a new process,
- up-to-date and complete project-controlling and -reporting,
- easy and usable tools to support the process,
- integration of intercultural aspects to the process.

Portfolio Planning provides in case of a successful adaptation of the process in the company a very useful and effective instrument to manage the portfolio. The first significant advantage is the alignment with the corporate strategy, the goals and the vision of the company [Hoffmann, Schmidt 2010]. The top-down approach is useful to break down the abstract investment intention into smaller and more detailed work packages which end as Scope Items that can be handled by development. The level of details goes along the process to provide the participants with the quantity and quality of necessary information to prepare the right decisions. The top-down approach is linked and verified through a bottom up approach by describing and committing the Scope Items by the development organization which is responsible to implement them. This commitment is also important for cross-checking the values of development with the previously made high level estimations on Sub-Cluster level.

The necessary alignment of the owners and stakeholders of elements through the whole company itself provides an improved communication structure which improves itself the transparency in a company. Providing transparency means in large organization managing the complexity. The aligned outcome of the process steps is communicated with the managers on the same level and also communicated into the organization.

Even with the described limitations of Portfolio Planning the companies in the software development industry have not an alternative to use Portfolio Planning or a variation of the described process as an instrument to wisely manage their investments.

6. Summary

Projects in large companies in the software development industry are not led by the Life Cycle Management Model only. Portfolio Planning integrates the LCMM in a much bigger approach than to look at one project only. Portfolio Planning is a transparent instrument which supports the decisions from the general representation to the greatest detail and gives a view on everything that is developed in the company. The result in each phase enables the top management to make wise investment decisions.

Portfolio Planning is together with Portfolio Execution part of Portfolio Management. Portfolio Planning is used in the Invent and Define phases to collect all business opportunities with the relevant data and information to make decisions about prioritization and the decision about proceeding with the plan or to stop it. First the Investment Clusters are defined with a high abstraction level. Each Investment Cluster is divided into Sub-Clusters which can be assigned to Portfolio Cases. Here starts the higher involvement of solution management by transferring the Portfolio Cases of their area into Portfolio Case Items and Scope Items. The Scope Items have to be completely understood and committed by development. After the milestone of Product to Development (P2D) the known phases of the LCMM start. Each Scope Item is assigned to a Development project and all Development Projects are part of the overall controlling in the Portfolio Execution phase.

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ISTOTA PLANOWANIA PORTFELA W PRZEDSIĘBIORSTWACH TWORZĄCYCH OPROGRAMOWANIE

Streszczenie: Producenci oprogramowania to w większości przedsiębiorstwa cechujące się szybkim wzrostem. Jednak wraz z rozwojem pojawiają się problemy ze strukturą i przejrzystością działalności, gdy realizowane projekty mają swoje własne znaczenie i dynamikę, nawet jeśli inne przedsięwzięcia mogły być istotniejsze z perspektywy klientów i celów organizacji. Planowanie portfela (PP) odnosi się do pierwszego ważnego kroku w zarządzaniu portfelem przedsiębiorstw tworzących oprogramowanie. Proces ten spaja możliwości inwestycyjne z ogólną strategią jednostki. Co więcej, zapewnia on niezbędne narzędzia i metody podziału pozwalające rozbić wizję na działania, które mogą być urzeczywistniane poprzez projekty rozwojowe. W artykule opisano zadania i obszary odpowiedzialności z zakresu planowania portfela, które jest procesem wymagającym intensywnej komunikacji i uzgodnień wewnątrz jednostki na różnych jej szczeblach.