

István Széchenyi Management and  
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A technological knowledge base for process-oriented project management for  
the introduction of ERP projects

Discussion of the hypothesis

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## 1. Aim and hypotheses

The aim of this dissertation is to develop a practical solution for the challenges in IT project management (IT PM). All challenges will be identified and analysed as a problem as part of a framework. Since the field of IT PM is being dealt with, a holistic and integrated approach should be developed. Integrated components should come from the fields of knowledge management (KM), business process management (BPM) and web portals. The holistic perspective arises from two factors. Firstly, separate synergies appear between concepts unrelated to the IT PM study context. Secondly, a solution will be reached on the basis of the aggregation of these separate synergies. The holistic approach will be achieved as the concept is built on three dimensions: technology, people and organisation.

- Hypothesis 1 The practical change of IT project management requires an integrated consideration which takes into account agile and classical procedure models, whilst incorporating the technology factor which supports communication in IT projects.
- Hypothesis 2 In order to retain and make available the knowledge about IT projects developed through the procedure models, a methodical influence of knowledge management is required, including the integration of an organisational knowledge base with regard to projects in requirements management.
- Hypothesis 3 The inclusion of business process management supports knowledge-based requirements management so that the changes in standard ERP software are documented from a business point of view.
- Hypothesis 4 The development of a project portal for the practical handling of requirements management makes the successful introduction of ERP projects more likely.
- Hypothesis 5 Business process-oriented knowledge management leads to transparency of functional knowledge of the portal as well as of the knowledge processes of requirements management, and supports the learning of technological changes in the company.

## 2. Research Method

Action research methods are used in this dissertation. Action research involves a variety of people who are studied by scientists and are no longer merely the researcher's source of information but individuals which the researcher tries to join on the path to knowledge. Action research is a comparative investigation of the conditions and effects of different forms of social action, as well as being a type of research which leads to social action. Fundamentally, it can be said that the objects of investigation are based on practical problems. The aim of interdisciplinary research is the shaping of the business reality, which means that practical guidelines are developed. The following facts arise from the transfer of these determining factors to the subject of this dissertation:

- The problem that this dissertation is based on results from real-life challenges. This problem is addressed with the help of scientific methods. The problem comes from the IT service provider industry.
- In one specific case, an IT service provider sees itself confronted by the problem posed by IT PM. The IT service provider is expecting a practical solution in the form of a remodelled IT PM. The background of the IT service provider is that it is a medium-sized company which operates Microsoft products (Dynamics NAV, SharePoint Solutions, SQL Server Systems, Microsoft Office products).
- In this dissertation, the problems will be organised and a problem will be deduced from the IT PM. During this structuring, the area of activity will be derived through theoretical knowledge and practical experiences whilst suggestions for the forming of the business reality will be developed. A concept for a solution will be produced which encompasses both theoretical knowledge and practical experience. The starting point is methodical approaches from scientific literature, other Microsoft partners as well as a group of employees from IT service providers.
- The involvement of a practical element in the research process will enable the concept for a solution to be tested and further developments to be made for its practical application. A survey will be carried out as a component of the qualitative social research on the basis of a random sample of people.<sup>1</sup> Furthermore, so-called detailed specifications on the basis of qualitative social research and narrative knowledge management will be used.

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<sup>1</sup> Cf. URL 52: the press release by the author and IT service provider.

- The result will be implemented in a prototype. The concept of a solution for handling requirements management during the introduction of software projects will be validated through internal tests in the participating company.

Further validations through pilot projects are not a component of the research process's documentation. Since action research requires the results to be checked both by practical tests and knowledge to suggest possible further developments, the prototype will be further validated using pilot projects. These steps will be carried out several times, during which the resulting solutions will gradually be refined and adapted.

For the purpose of gathering information, the research will be divided up into two groups: primary and secondary research. The primary research represents the part of the research during which data and information are collated.<sup>2</sup> Secondary research has a supporting function as part of the solution for the problem to be researched, since it concentrates on the processing of existing information that has already been collated by the researcher or a third party for the same or a similar purpose.<sup>3</sup> The sorting of existing information started during the information gathering process in order to create a link to primary research.<sup>4</sup> Both research sources are used in this dissertation. A survey will be carried out by making a questionnaire available to companies via an online portal. The aim of the survey is to find out how current IT PM is rated by software companies and where strengths and weaknesses lie. By building on these results, specific guidelines can be made for companies which can then be implemented in a holistic and integrated IT PM. The survey is aimed at IT managers, functional heads and company management in companies and organisations. The foundations for the survey will be compiled in advance during secondary research, which means that specific problems in IT PM will be identified so that they can be addressed directly. In addition, potential problems based on theoretical knowledge of this work are discussed in the questionnaire. The results of the secondary research, the problem and the framework will be discussed with the company that is to be researched, and will be adapted to the problem in the questionnaire accordingly. In the primary research, detailed specifications will be established with a defined group of employees from the IT service providers in order to gain an in-depth oversight of the content and technical requirements for future requirements management (RM) as part of IT PM.

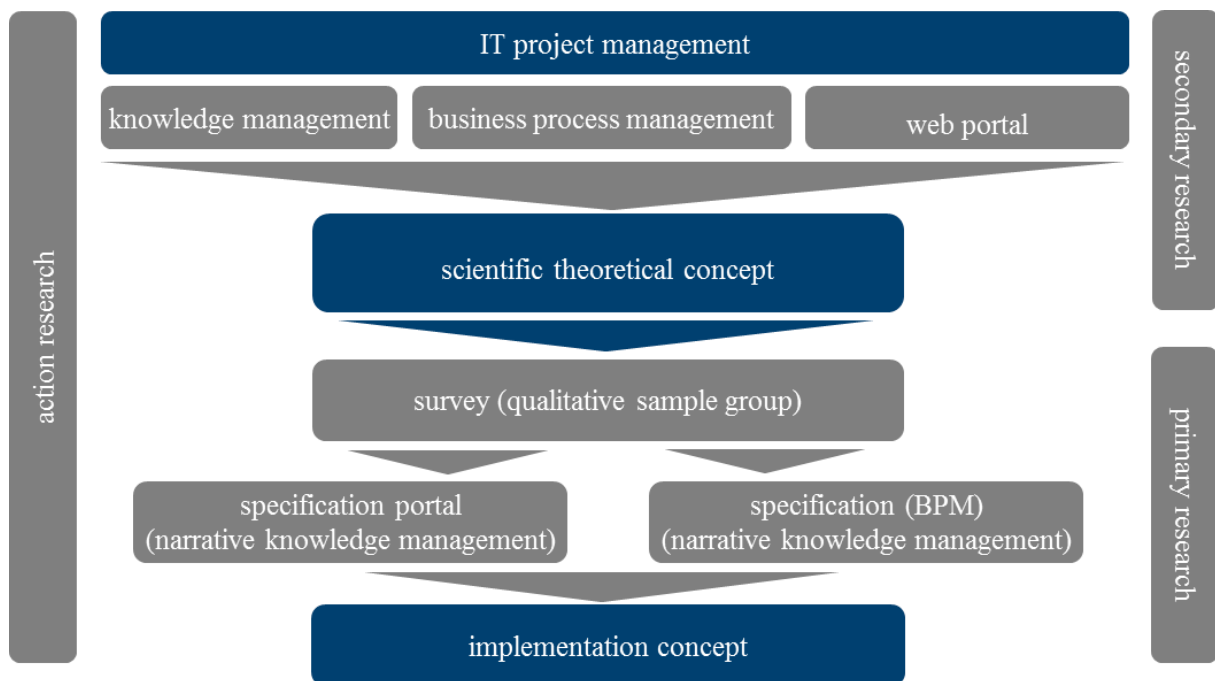
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<sup>2</sup> Cf. Weis/Steinmetz, 2002, p 45.

<sup>3</sup> Cf. Wöhe, 1995, p 615 und Weis/Steinmetz, 2002, p 62.

<sup>4</sup> Cf. Kastin, 1995, p 19.

**Diagram1: Research methods and research sources**



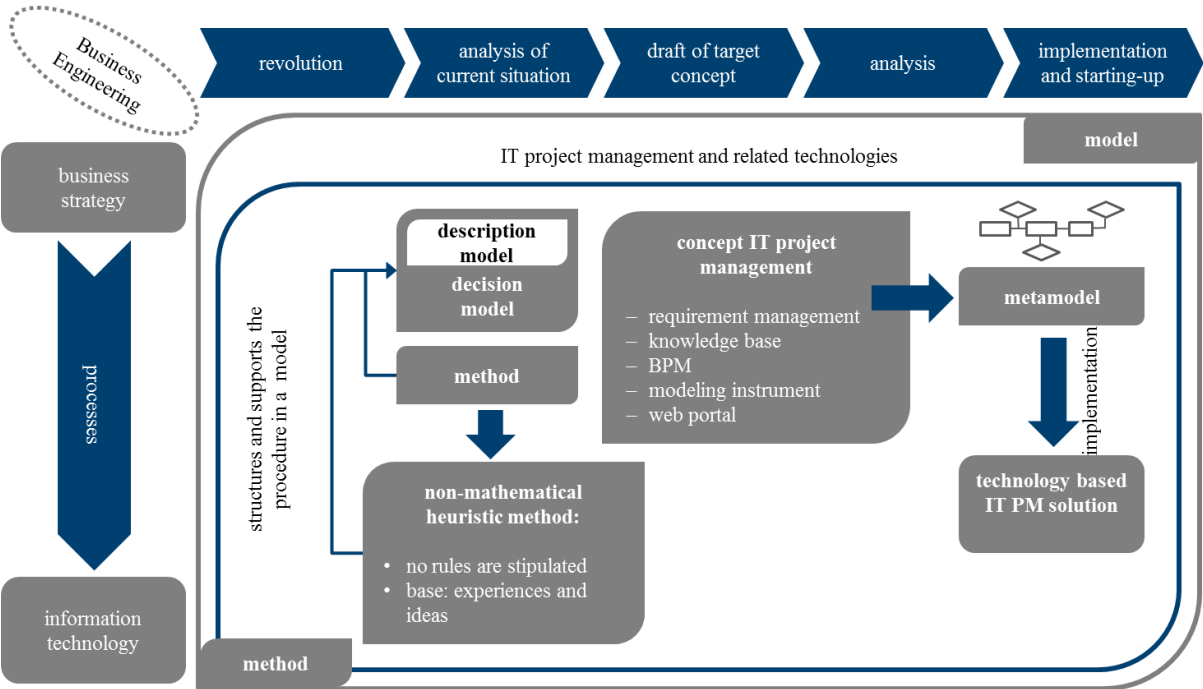
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In accordance with IEEE 830-1998, a software specification must, at the very least, contain an introduction, general description, specific requirements and supporting information. The concept for the future IT PM web portal was produced using the detailed specifications. Subsequently, a further detailed specification will be carried out in order to link a selected business process modelling tool relating to RM to the web portal. Both detailed specifications will be methodically supported with qualitative social research. Narrative knowledge management will be used as technology in order to collate the employees' practical experiences.

As the topic of this dissertation belongs to the field of business engineering (hereinafter shortened to BE), the practical aspect requires a methodical approach which is appropriately explained. BE supports companies with the implementation of changing business processes and technologies. Reasons for a change may be, for example, developments in the area of information and communication technology. In the case of this dissertation, this is the implementation of a modelling tool as well as a web portal. With the help of BE, a link is created between business studies and IT. The key that binds business knowledge with electronic knowledge can be found within business processes. This transformation comes about through certain means of depiction and procedure models. The BE procedure consists of five phases and begins with revolution, which is innovation inside of a company and accompanies the founding of a project. In the practical application this is the ordering of a project. In the second phase, an analysis of the current situation takes place. During this phase the current situation within

the framework of the project is described and structured. The draft of a target concept is made. The fourth phase incorporates the analysis of the current situation and a target concept, and a comparison of both phases is carried out. The BE approach ends with the implementation and starting up of the project. The advantage of this approach lies in the fact that models and methods are used in achieving the goals of BE. This means that the goal of BE - producing a link between business management and IT - is based on the application of models and methods. First of all, a practical problem exists within business management: the problem of IT service providers, i.e. the problem lies in the restructuring of IT PM. E-portfolios have been suggested as the foundation for a knowledge base for project organisation. Web portals are the technological tools with which holistic IT PM will be implemented. BPM will be integrated in the solution in order to support the structured and user-friendly recording of requirements. An analysis of the current situation will be carried out during the second phase of the approach model, which will be transferred to a single model in order to simplify and separate the problem. The separation is the framework of IT PM and the current situation with the IT service provider.

**Diagram2: Business Engineering model for the IT PM solution**



Source: own illustration.

The description and decision model for simplifying the problem was selected on the basis of different model types. The description model helps to explain the practical problem and forms the foundation for the structuring of the problem. This structuring subsequently takes place with the help of the decision model. A further method is used to bring the current model to

life. A method structures and supports the approach in a model. In this model, the non-mathematical heuristic model is chosen. The reasons for this are, firstly, that this method does not stipulate rules for further approaches and thereby allows qualitative research. Secondly, it possesses the characteristic of having experiences and ideas at its base. The IT service provider's employees are involved. The aim of the model is to introduce an altered problem on the basis of the development of an IT PM solution concept. For this reason, a target concept was drafted in the third phase. The framework includes the draft of how the solution concept should look. The fourth phase suggests analyses to compare the draft with the current situation. This approach will take place at various points during the practical stage. Attempts will be made to find an optimal solution with the help of tests. Once again, the basis is the experiences of the IT service provider's employees. The reference to the non-mathematical heuristic method is recognisable. It supports and structures the approach. In comparison with the current situation analyses, the model types have not changed. Alternative actions are developed inside the decision model in order to then work out solutions for the existing problem. The description model serves to explain the possibilities produced by the decision model. Once the implementation and starting up process begins, the methodical approach comes full circle. During this last phase, the joining of business management and IT takes place. A further aspect of BE is formed by method engineering, which is responsible for the final transformation of the named areas and comprises many components. The metamodel forms the components which are most important for transformation. A metamodel is a model of a basic model, which behaves in exactly the same way as the actual basic model but is easier to analyse. Through the use of models and methods, an IT solution is produced on an almost exclusively information management level. In order to make this solution implementable for IT specialists, a metamodel is added which depicts linguistic information with the help of symbols. As a result, the implementation is depicted in a comprehensible way for an IT specialist so that they can make the solution practicable.

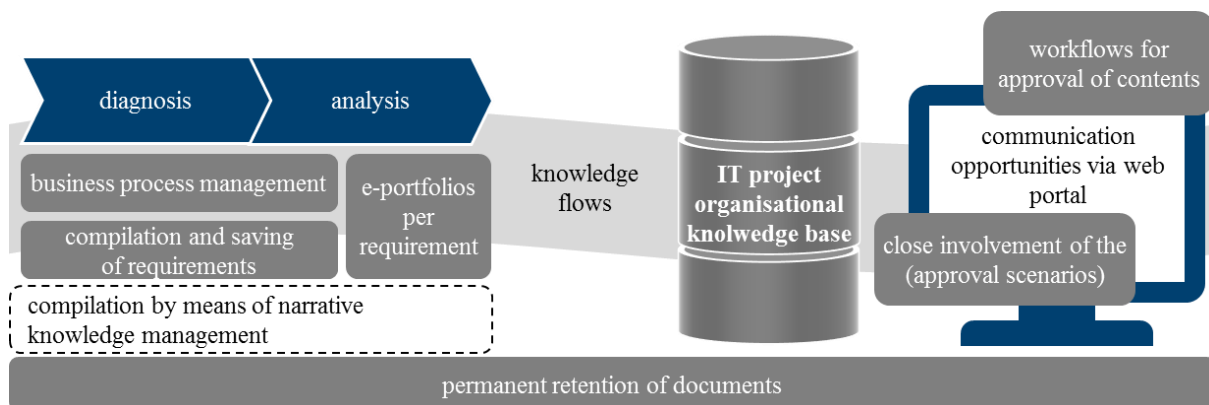


### 3. New research results

The solution comprises content components from management fields such as knowledge management, IT project management and business process management as well as a prototype in the form of a web portal. The creation of a tool, the result of which is this work and which contains the combination of different business and IT content, can be seen as a first step towards practical implementation and documentation for IT specialists. The work exceeds the business theoretical approach and delivers worthwhile new results with models and guidelines in technology-based practical implementation. The prototype is being tested in pilot projects by the cooperating company's customers and will be further developed thanks to this real-life usage. The following argument demonstrates the innovation, uniqueness and currentness of the results of this work. This argument is structured on the basis of holism according to Bullinger et al.

With reference to the organisational and content dimension, the draft of the project organisational knowledge basis is the methodical result of the synergies between IP PM, KM, BPM and portal technology, as the diagram below shows.

**Diagram3: Project organisation knowledge basis for a process-based RM.**



Source: own illustration.

An implementation concept such as this does not exist in the IT world. The implementation of the e-portfolio as requirement documentation is new. The methodical continuation finds its conceptual completion in the depiction and description of models for instructing the designing of portals relating to business engineering, as well as the basis for teaching content for portal users. The idea of integrating and combining classic approaches with agile methods has been implemented and will find approval in the IT world. In this sense, the first process-oriented (work and knowledge flows) navigation for requirements management on the basis of agile and classic approaches has been created. This means that the integration of consent and ap-

proval scenarios in requirement and specification gathering, as well as feedback, are an integral part of the solution concept. A unique IT PM for implementing Microsoft Dynamics NAV is available to the IT world. At the same time, this result means promoting organisational learning and creating a knowledge base for processing IT projects. Regarding content, the colouring for processes and activities in the process model for different components of the software solution as didactic support in the sense of Soft Systems Methodology, through which problem situations can be structured, is also new. The technological innovation is the prototype of a portal which depicts the project organisational knowledge base in relation to requirements management in the IT PM approach model. There is currently no portal such as this on the market. The implementation occurs completely in Microsoft SharePoint 2010 (standard functions) which means that the maintenance of the entire project takes place on a website. The maintenance of many different customer software projects can also be found on the site. Simple replicability of the portal is guaranteed for new customers. Instructions in various languages are available for international projects. The technological link of the process model with the requirements for categories/subcategories (link of BPM with IT PM) ensures integrated evaluation. E-portfolios for business and technological requirements are an integral part of the technological solution. Training materials have been developed for users. These materials can be perfected for the IT service provider's employees with the help of KMDL modelling. In principle, training materials can be generated for employees using process models. Through comments and feedback with regard to requirements (e-portfolios), employees of both parties (customer and contractor), are equally "valued" and involved more heavily in communication and supported in the project. The success of the restructured IT project management can only be lastingly qualitatively assessed after a longer period of time. Therefore a range of pilot projects among different practical and business situations is required. An exchange of knowledge and expert experience should not only occur in the direction of the customer. Distributors of the solution, Microsoft - as the producer of ERP, Visio and SharePoint - and the associated partner companies in Germany should have an active role in all aspects of the restructured IT project management. Whilst using the approach model and the portal, the desired synergies will come about by contributing to the development of the processes with help of the business software. Business processes are coded, forms of knowledge for implementation are identified and knowledge flows are thus made comprehensible across different functions. The integration of the management concepts for supporting implementation projects is a method which contributes to the increased performance of companies taking part in the competition.

*Hypothesis 1: The practical change of IT project management requires an integrated observation which takes into account agile and classic procedure models whilst considering the technology factor which supports communication in IT projects.*

The first hypothesis is true. The isolated application of a single procedure model leads to the failure of the IT project. The idea of integrating and combining classic approaches with agile methods is indispensable for the future and is widely approved in the IT world. The completed online study, as well as participant observation when implementing this detailed specification, confirm these results. From the current state of literature in the IT world, it is clear that there is a lack of practical experience and concrete explanations relating to application and implementation. In order to change the daily work of IT project management through a combination of the procedure models, customers must be closely integrated in the sense of agility during development. This step requires communication and interaction which can be technologically supported with appropriate tools, such as portal technologies. This leads to the recognition of the fact that tools which support IT project managers and their teams must be developed. Since both specialist IT literature and the completed study have led to the realisation that customers expect both well-founded documentation of the expected result (classic procedure model) and also high flexibility relating to changes (agility), systematic, transparent but also flexible requirement management is to be integrated into the procedure model. For advocates of the classic procedure models, the customer's integration via approval scenarios and flexibility to changes are manageable, as structured changes via communication tools are integrable using methods. Some classic procedure models, such as the V or VXT model, offer the possibility of working in intermediate steps for checking and adapting content. Of course, this must take place within the budget framework. Alternatively, regulations are made regarding how changes in project progression are dealt with commercially. In addition, the study has shown that the aims and uses with the customer from the contractor's perspective have to be discussed and documented appropriately. This fact is compatible with classic procedure models, since the quality of documentation is improved. As part of this, budgets must be determined and instances for cost controls as well as status reports must be made, as the study showed that costs are often overstated. If agile software developers wanted to do without certain documentation, they would at least have to agree on the content with the customer before commencing. This means that potentially undesired developments, which are a known part of agility, can be avoided. Effectively, in relation to this dissertation this content has only positive aspects.

However, the findings of the study as well as the developments for the advocates of agile procedure models are problematic. A structured approach and comprehensive documentation accompanied by a simultaneous increase in communication expenditure is a scientific setback. Deep-rooted agile developers will not take these points to heart and integrate them in their approach. The purity of the development lies in the freedom of agility. However, if one considers the quantity of IT projects that currently fail, this theory is supported on the basis of the research results and requires a combination of both procedure models, allowing for technological communication resources. The study and the developments have shown that a lack of availability of information and documentation with simultaneous use of email and telephone as communication tools dominate IT projects. The potential for using technological platforms as a means of communication is highlighted in the evaluation of this theory. A merging of these factors leads to a significant change in the current procedure of IT projects. The isolated application of a procedure model must give way to the findings of the combination, and is the research result of this work, which all support the first hypothesis.

*Hypothesis 2: In order for the knowledge of IT projects developed through the procedure models to be made available and retained, a methodical influence of knowledge management is required, including the integration of an organisational knowledge base with regard to projects in requirements management.*

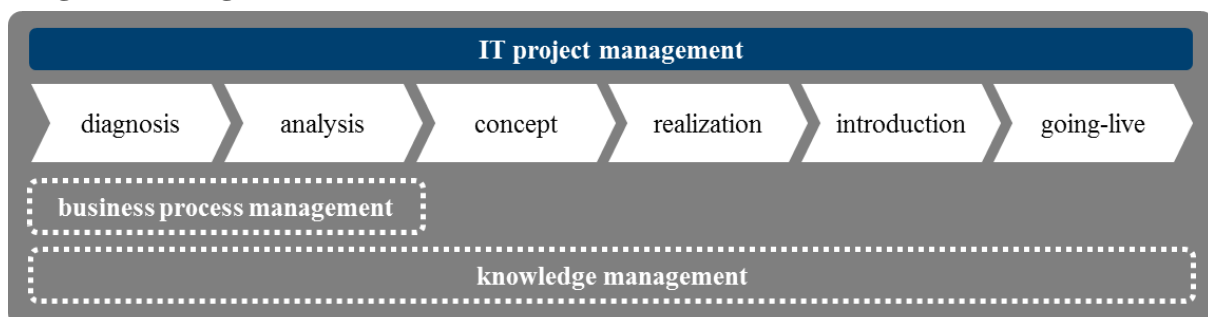
The second hypothesis is true. The relevance of knowledge management in IT project management will be essential in the future. Unfortunately, knowledge management is followed by an inconsistent approach which has been shown by not only the literature but also the study. It is the identification of knowledge itself which should be at the forefront at the beginning of a project, in order to collate the relevant information for the further running of the project (this is referring to contract foundations or the development of solutions in the project). The study shows a significant lack of documentation of all content. Procedure models, in particular classic ones, require comprehensive documentation, which is shown by the secondary research. However, it has been shown in practice that knowledge management is simply not considered during the execution of IT projects. The realisation that knowledge management often lacks context and is too abstract can presumably be viewed as a reason. In addition, the fundamental dealing with knowledge management is a resource binding element which medium-sized business cannot or do not want to bear. Comprehensive knowledge-based and process-orientated documentation requires time. The fact that a knowledge-intensive creation of a concept needs to be budgeted represents a compromise for all participants in the sense of the theory. Therefore, it is only when budgets are known and the customer receives a well-

founded concept and can argue in favour of its usage, that they will be willing to pay for this knowledge. The methodical exertion of influence of knowledge management in IT project management requires a project organisational knowledge base within requirements management. The heads of IT services are required to develop this knowledge base. The majority of IT service providers will shy away from this self development due to lack of resources, and will instead decide on the accuracy of the theory but will not draw any conclusions for their own business actions. As a result and as is seen in practice, cheap IT projects without knowledge-based documentation will be sold successfully even when they may not be ideally suited to the customer. In this way, software systems do end up in use sometime in some capacity. In order to support this thesis, literature can be used as a handbook of the knowledge identification component for the structured collation of requirements. In combination with business processes for IT supported companies, a pragmatic solution for identifying knowledge is created so that a methodical exertion of influence occurs from the beginning of every IT project. These thoughts refer to the findings of the secondary research whereby the product management processes of a company are illustrated in an ERP. A specification must be made for every business case that deviates from the standard. This specification serves as the starting point for an e-portfolio in terms of knowledge management. All subsequent actions that are based on the specification must be linked to the e-portfolio and retrievable there so that IT project management is holistically influenced by knowledge management. The narrative knowledge management methods should be used when creating the supporting project organisational knowledge base. Project leaders' practical knowledge is hugely important and must be collated. The retention of experienced employees' knowledge can be used as an argument when dealing with a company which decides against knowledge management in an IT project because of costs. The project organisational knowledge base approach requires the use of models of both developed knowledge flows and those still to be carried out. The newly created knowledge flows should be illustrated transparently in order to find out what the employee needs to know about the new approaches. The method is also used so that employees learn which knowledge is collated in which situation. The training content is extrapolated on this basis. The fundamental process of the restructured procedure model must also be illustrated so that it can be learnt by employees. Some points speak against a methodical exertion of influence of knowledge management in IT projects; most of all costs and time, i.e. scarce resources. Despite this, there are many arguments for the integration of knowledge management in a procedure model for processing IT projects, which is shown in the arguments in this thesis. Most of all, the results of this dissertation prove the correctness of this hypothesis.

*Hypothesis 3: The involvement of business process management supports knowledge-based requirements management so that the changes are documented in standard ERP software from a business perspective.*

The fact that, in line with the third hypothesis, business process management becomes a part of IT project management, has both advantages and disadvantages. The arguments will be explained in the following discussion. The arguments for or against process evaluation in ERP projects could not be more contentious. The findings of this work, in particular based on the study and the collaboration with the employees of the cooperating company, lead to the result that the hypothesis, after weighing up the arguments, can be seen to be true. First of all, the methodical evaluation of processes offers knowledge management a context for development, in particular with the gathering of knowledge about processes. By linking the topics, the learning ability within the organisation is encouraged, which is in line with the theories of Simon, Checkland and Probst/Gomez. An analysis of the current situation is the ideal tool to identify knowledge processes. From a business process management perspective, the analysis of the current situation must become an integral part of knowledge based requirements management. This will mean the results of the study, the documentation of software processes, current and future processes, can be conceptually realised. If the documentation occurs through notation, then knowledge can be retained and shared in the future. The standard ERP process documentation, which is required in the study, can be implemented with the creation of a process model. If, at the beginning of a project, this process model is used as a reference as part of the analysis for structuring the customer's problem situation in order to develop a future and company specific process model from it, then a decisive knowledge base has arisen for organisational learning in social systems. Through its phases, IT PM offers a content framework to operate BPM. Effectively, knowledge management is operated within IT PM through the integration of business process management.

**Diagram4: Integration of GPM and KM in IT PM**



Source: own illustration.

The possibilities regarding BPM content offer a concrete solution in relation to process models. IT service providers could create standard process models for their software solutions. This means that, as part of analyses, key users could first of all be shown the processes which belong to the software, so that a standardised understanding of the software can be achieved with process diagrams instead of software interfaces. The content arrangement of requirements documentation (e-portfolio) should be expanded with a process view. This means that all participants in the project know the procedural (business) reasoning for a requirement. In addition, the findings of the study - that the commercial reference to developing individualities in standard software is lacking in the documentation - are taken into account. A process-orientated perspective must be a part of the requirement document. ERP illustrates the organisational and commercial business processes technologically. Insofar as the programming of commercial ERP standard processes must be altered, this adaptation must be founded accordingly relating to programming. The synergy between the process-orientated perspective of technological adaptation and the permanent retention of the specification means that company directors and users of the software can still see years later what the commercial reasoning for the adaptation was.

The study and scientific developments have shown that the documentation of processes is indeed encouraged but is not found in practice. Opponents of the third articulated theory argue that, firstly, additional expenditure arises which is difficult to accommodate in project budgets and, secondly, that the current qualifications of IT service providers' employees would mean that a development such as this is not possible. Developers are also often consultants in personal unions which mean that, alongside advisory skills, programming competence is also required. IT consultants are not process advisers. Insofar as no process model exists on the market for the software solution, the creation of a standard process model is already time-consuming and complex enough. Knowledge must be expanded on in this regard. However, due to the restrictions of available resources, this is simply not possible. In addition, analyses complicate the use of process models. An IT consultant must advise not only functionally, but also by using the process model. This means that the IT consultant essentially has two applications open at once: the business process application as well as the actual software.

The problem of IT consultants not being process advisers can be solved differently. Targeted training in employees' further development is an investment in the future. Additional sources of revenue with process consulting may become accessible. However, employees have to want to take this step and have to be motivated to take on further development. In addition, it is also possible to aim for cooperation with consultancies specialising in organisations. In this

case, the main contractor must be sorted out. Cooperation must be extended cautiously. It is medium-sized companies which do not want any increased complexity when introducing software.

When evaluating the current growing complexity and extent of technological aids on offer, ERP IT service providers today often already work with partners for DMS; portals; computer-aided telephones; mobile applications; business intelligence solutions for analyses; and infrastructure. This means that there are already many companies working on complex IT projects. In the event that an IT service provider is a full service provider, i.e. one offering all of the solutions discussed above, the company has many different advisers and developers for the respective topic available. For a project at a steel dealership with 15 computer work stations, this also means that many consultants have to work on-site during the project. A project can quickly become confusing when there is no clear assignment of roles. IT service providers should nevertheless think about cooperation. The fact that organisation and process consultants support specification as well as introduction, particularly with analyses, can be beneficial to the project. Every project should be optimally prepared with regard to its requirements and resources. If projects make organisation consultancy possible, carrying it out with the help of a third party should not be ruled out.

For all IT service providers, it is important in this respect that standard technologies are usable. This is true for business process models as well as for portal technologies. It is not only the fact that technology is used in projects for customers, but also more and more that the technology is usable for its own purpose in relation to business dealings. Standard applications can be supplemented. So-called branch solutions from different suppliers of the same standard software in the process model can be integrated with existing process models. These process models can be sold to companies. This is how new products are created and distributed. To make it more marketable, additional chargeable services can be generated with the support of modelling. A portal, which was created in this work, could also be sold or rented to companies. Companies with a development department often have project management teams. A project is started for each individual product development. Requirements for the development are defined, specified and tested. The created portal can be used for this purpose. If IT service providers use standard products and technologies, they cannot develop and the companies remain in familiar territory. This means that, according to the arguments, this hypothesis is true.

*Hypothesis 4: The development of a project portal for the practical handling of requirements management makes the successful introduction of ERP projects more likely.* Despite the ar-



guments and developments covered so far, this fourth hypothesis can still give rise to controversy. When looking at the facts of why ERP projects fail, it is clear that technology plays no part. Projects fail because of communication, project planning and project management (preparation and execution), professional shortcomings and due to changes in requirements in the project. Opponents of technological development and hypothesis four argue that technological aids can be used as support, however the people working on the project should be prepared for the project situation as well as possible. When considering the failure of projects, people are firmly under the spotlight. Above all, thorough project preparation, a structured approach for collating and using knowledge relevant for the project are decisive for the performance of the roles of people in a project. Projects must be organised optimally, including with regard to communication. Topics such as expectations of both parties; setting targets; requirements; structure (time, organisation and resources); and the method of the project must be dealt with and planned in a detailed preparation phase. If the people taking part consider these topics and ensure continuous synchronous communication, the project does not require a portal to complete it. However, hypothesis four is supported by advocates of technological advances on the basis of existing results, in particular in the times of standardised technological aids. Every future participant in the project must be made aware of the relevance of the portal developed as part of this work when using it. Therefore the success of a project does not depend on the development of a portal, but instead on the people who operate and implement the portal. Communication culture and rules must be decided during the preparation phase of a project. This hypothesis cannot be confirmed if the successful execution of a project is only influenced by communication. However, the portal should not only be discussed in terms of communication but also, as the thesis above show, from the perspective of requirements management. Business process management and knowledge management are also relevant as part of requirements management. The use of developed concepts lies in the integration of different aspects which, in collaboration between customer and contractor, are the difference between success or failure. If one expands the preparation phase to include diagnosis and analysis phases, then in this case the portal for knowledge identification is particularly relevant. Knowledge flows go through the portal, develop the knowledge base and promote organisational learning. E-portfolios ensure that relevant knowledge for a commercial process remains consistent and permanently accessible. All of these connections must be conveyed to the participants so that the portal actually becomes the knowledge base of the project. An application-oriented discipline when dealing with the portal is required. The developed portal, including agile and classic instances, ensures that there is a structured approach to planning,

control and execution. The application of the portal ensures that continuous checks are made on the progress of the project. Integrated agility means that approval scenarios of internal (internal quality control) are carried out externally. Feedback (so-called change requests in the IT world) means that it is possible to react flexibly to changing requirements. Despite the agile elements, IT project management features clear structures through its phased conception. Causes of failure can be structurally counteracted via the portal. The requirements are ensured through development in the sense of process and knowledge-based requirement management. Furthermore, in the general PM context, the portal offers the possibility to upload documents such as project plans, project concepts, protocols, commercial records and official status reports. Major causes of project failure can be minimised through the use of the portal as part of a communication culture. If this hypothesis is considered in the narrower sense without including the human factor, then the mere existence of the portal as a technological aid will not lead to increased chances of success. Therefore this hypothesis can be seen to be wrong. When viewing this hypothesis from a holistic and practicable (practical execution) perspective, the hypothesis can be seen to be true, as key elements lead to ensuring that the project is completed successfully. However, the human factor, as well as communication, must also be taken into account. The use of the portal relating to business process management, requirement management, agile instances and a classic procedure, as well as a knowledge base and organisational learning, must be passed on to the participants who should also be motivated to use it. Furthermore, the portal must be the essential core of the means of communication as part of the communication rules. The knowledge made available in the knowledge base can also be seen as a means against human forgetfulness. The probability of success then increases. Firstly, the owner of the cooperating company confirms this in the publication on the firm's homepage (See URL 52 in the dissertation). Secondly, the prototype has been presented at a customer event in front of around 160 people. The customer feedback was consistently positive. These indicators of a successful execution of projects require consequent finalisation and application in the near future.

*Hypothesis 5: Business process-oriented knowledge management leads to transparency in functional knowledge about the portal as well as about the knowledge processes of requirements management, and supports learning about technological changes in the company.* The results of this work have shown that many companies would like to use standard process models. Although disadvantages exist when dealing with business process-orientated knowledge management, the fifth hypothesis can nevertheless be seen to be true. An approach based on a reference model for organisational learning contributes to building up a fundamental understanding of processes. However, it has been noted that although a reference model does indeed save time and leads to an effective introduction of software, the fact cannot be disregarded that, when the problem situation has been understood, employees could resist the introduction of standardised processes. The current processes within a company must be evaluated in detail. The consideration of whether the existing process is perhaps even better must be discussed - not least to get people gathered together, as Simon suggests, in order to discuss and find a solution for the problem together. Fast application with the aid of BPM leads to standardisation. However, no company, especially KMU, is standard. Every company has its own unique characteristics as well as success factors that are expressed in processes. Therefore, it is probably important to consider how the future process model looks on the basis of software standards. The unique characteristics, as well as the essential activities of the contribution to added value, can be modelled in the reference model. Joint consideration and development leads to a high level of acceptance and supports organisational learning. However, at this point the economic factor cannot be ignored. If all individualities have to be modelled at high cost, questions have to be asked about the correctness of the selected reference model. The choice must be well-founded. If, despite it being correct, many target processes must still be modelled, cost effectiveness should be considered. Creation costs should not exceed the actual value. Maintenance of the process model also has to be considered from a costing point of view. It is junior employees who, during their scientific academic training (degree course), take over the role of the process modeller during the practical phase (part-time employment) of their course. The modelled, serviced processes make a contribution to the well-being of the company. The IT project management portal supports these services. The connected standard process reference model ensures a significant transparency regarding the software's commercial processes. The knowledge is usable via the modelling of knowledge intensive processes. The retention of reference models for ERP software or for the portal's processes forms the basis for the training of employees or those taking part in the project. Employees get to acquire the relevant process knowledge. This means technological changes can be taken into

account for the long-term. Important knowledge for creating and carrying out services (development and application of the software) can be learned in a structured way. Training content on the basis of the models and the knowledge contained in them encourage the learning of new technology, as well as the newly formed approach in IT projects linked to them..

## List of publications

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