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Critical Success Factors of Portal-Based Knowledge Management

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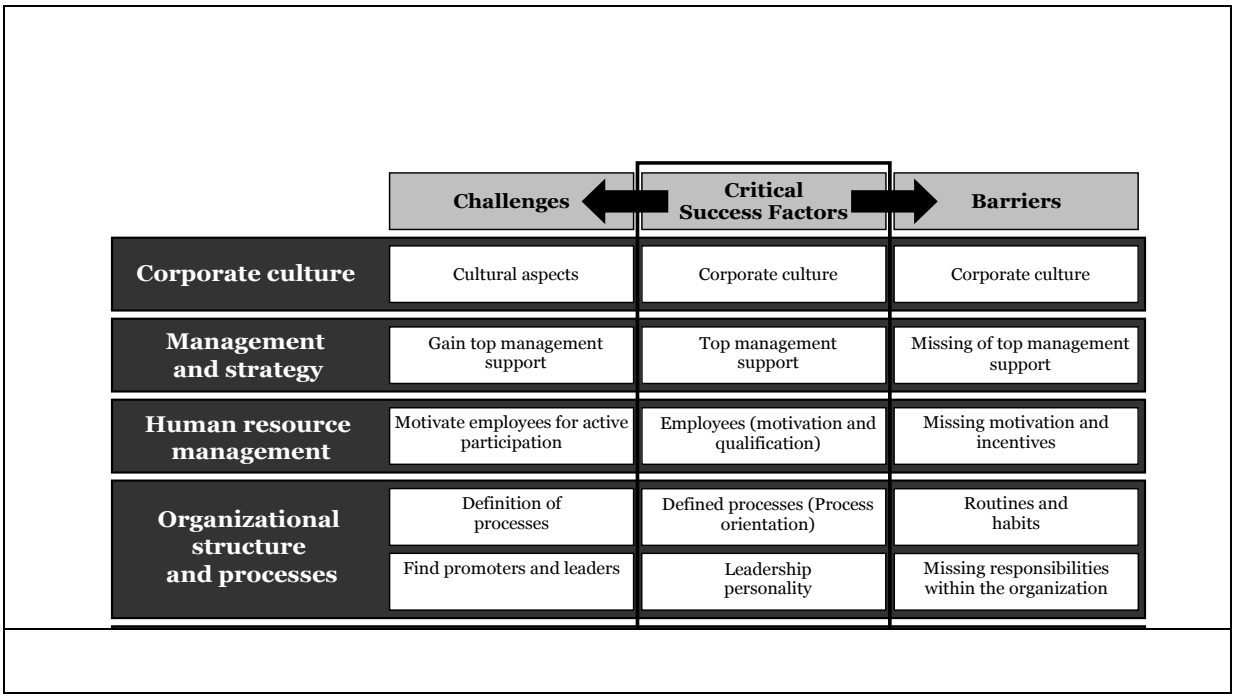

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Content

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Completed Research Paper

Introduction

Against the background of ever increasing competition and the advancement of globalization, and thus an explosion of data and overload of information, enterprises and organizations are faced with the challenge of understanding knowledge as a production factor. Loss of knowledge must be prevented and intellectual capital must be utilized (Alavi and Leidner 2001). Since the mid 90s, knowledge management (KM) has provided an approach to meet these challenges (Davenport and Prusak 1998; Wiig 1999).

Once companies recognized the potential of knowledge management, they began to provide their employees with applications such as intranets and groupware in order to leverage their knowledge. Over time, increasingly disillusionment set in, because the technical solutions did work, but only few employees were willing to provide their knowledge and share it with others (Malhotra 2005). Knowledge management requires technical solutions and support. Enterprise portals provide the necessary tools that can be accessed independent of location and can be used as the central platform for employee collaboration and as a store for explicit knowledge (Detlor 2000; Remus 2006). This knowledge management is called portal-based knowledge management.

Simply introducing such portals does not guarantee success (Collins 2003). Only successfully introduced portals fulfill their potential for support and make a true contribution to the success of a company (Le-Nguyen et al. 2008). Introducing a portal causes a considerable expense for a company and can only be justified if the benefit clearly surpasses the costs. How the introduction of portal-based knowledge management can be successful remains to be understood. A number of critical success factors (CSFs) must be taken into consideration (Remus 2006). Only a few models take these critical success factors, which are relevant to successful introduction and usage, into consideration (Butler and Murphy 2007, in the context of public sector organizations). These critical success factors are generally not consistently taken into account during the introduction of portal-based knowledge management.

The objective of this paper is to identify the critical success factors for introducing portal-based knowledge management and to derive a process model based on an introduction strategy. We will show how the critical success factors can be taken into account as part of a process model to define concrete measures. The goal of this approach is to reduce the often high level of complexity in decisive situations within this context and to make optimal use of the opportunities that arise in order to contribute to the success of the project.

Two following research questions act as a framework for our research:

- Which critical success factors, challenges and barriers exist in the introduction to portal-based knowledge management?
- How can the previously identified critical success factors, challenges and barriers be considered in a process model for implementing portal-based knowledge management?

This paper is structured as follows: The next section provides an overview of the research design and methodology. The section that follows provides and compares the results of an empirical analysis of reference and process models for knowledge management and the implementation of enterprise knowledge portals to the state of the art (best practices). Due to the lack of existing models, a process model for the implementation of portal-based knowledge management is created. During development of this process model, recommendations for phases and activities are made that take the critical success factors into account and that help overcome the barriers that arise during introduction and use of portal-based knowledge management. The closing section shows how to integrate the identified success factors into the model and concludes by summarizing the core statements and the main new insights.

Research Design

The motivation behind this research comes from our own observations and experience as consultants in implementation projects for intranets and from observations and experience as employees in a center of competency.

In order to get useful and intersubjectively comprehensible results on the topic, we chose a two-step exploration (Figure 1). In the first step, an extensive, international literature review was performed. The final result of this literature review was a broad overview of the theoretical basis. The second step of the exploration was used to determine which critical success factors must be considered – and which challenges and barriers exist – to successfully introduce portal-based knowledge management. 31 experts were identified and interviewed in-depth. The final result was the development of a process model.

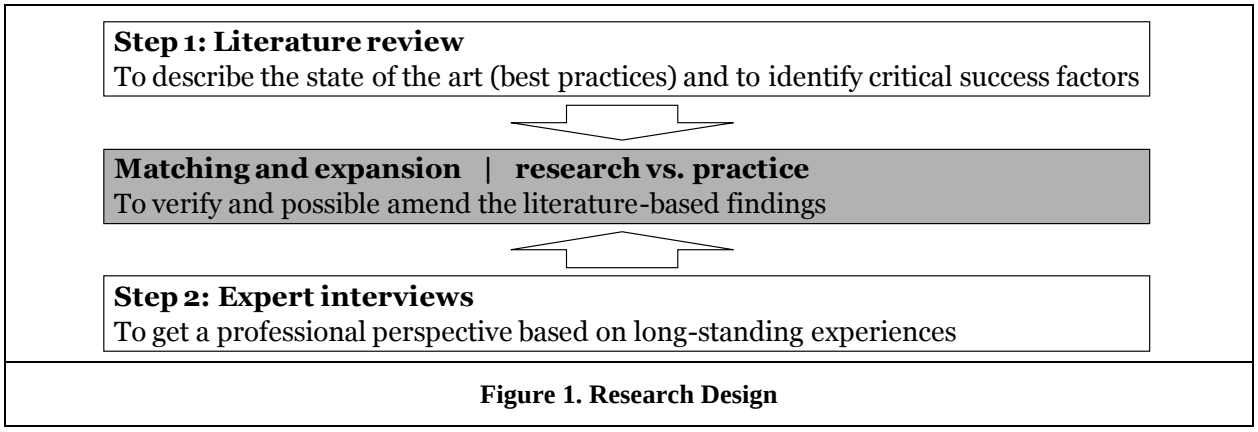

Figure 1. Research Design

Step 1: Literature Review

To get an overview of the information that is currently available, we did a review of current literature in the first step. "A review of prior, relevant literature is an essential feature of any academic project." (Webster and Watson 2002) For this article we worked under the assumption that the successful introduction of portal-based knowledge management is an area for which research is in the early stages. The goal was to find published academic articles in journals and conference proceedings that discuss the specific aspects of portal-based knowledge management and the introduction of enterprise portals. These are objectives, challenges, critical success factors and barriers. The major databases, ACM Portal, AIS Portal, Elsevier Science Direct, Springer and Google Scholar are selected for the baseline search for relevant papers. The terms *knowledge management*, *enterprise portal* and *knowledge management system* are used as search criteria. Manual research includes the selection of referenced articles and papers related to the search criteria.

In total, 63 papers are identified. All of these papers are reviewed in full for their relevance to the research question. Because this topic of research was only touched in approaches that focused on critical success factors and barriers on reference or process models and only from a specific point of view, that is, knowledge management or portals, we chose an explorative design to answer the research questions. Thus we use qualitative methods, because portal-based knowledge management is a current phenomenon. First the areas of activity that can be affected by the interventive measures were identified in the field of knowledge. According to Beckman (1999) and Maier (2004), these relevant areas of activity include corporate culture, corporate management and strategy, human resource management, organizational structure and processes, and information technology. Critical success factors are assigned to these five areas of activity and must be taken into special consideration because they contribute toward overcoming existing barriers and leading the portal project to success. Papers that did not refer to the subject at hand were excluded. The remaining 22 sources were examined to determine critical success factors, challenges and barriers. Additionally, seven reference and process models from the knowledge management and portal areas were analyzed. Table 1 provides an overview of the final paper selection.

Table 1. Final Paper Selection of Literature Review			
No.	Authors	Focus	Year
1.	Heisig/ Vorbeck	Benchmarking study	2001
2.	Wilkesmann/ Rascher	Expert interviews	2001
3.	Bullinger et al.	Study	1997
4.	Holzmüller/ Lammerts	Expert interviews	2003
5.	Linde et al.	Expert interviews	2004
6.	Remus	Expert interviews	2006
7.	Davenport/ Prusak	Case studies	1997
8.	Vogel	Experience	2002
9.	Dobiéy	Experience	2001
10.	Helm/ Meckl/ Sodeik	Literature review	2005
11.	Ackermann et al.	Expert interviews	2000
12.	Reinmann-Rothmeier/ Mandl	Delphi study	1998
13.	Disterer	Research	2001
14.	Ruggles	Expert interviews	1997
15.	Großmann/ Koschek	Experience	2005
16.	Riege	Literature review	2005
17.	Herbst	Experience	2000
18.	Gurzki/ Özcan	Study	2003
19.	Maier	Study and literature review	1999
20.	Jäger/ Straub	Study	1999
21.	Heisig/ Orth	Study	2003
22.	Jennex/ Olfman	Literature review	2005

Step 2: Expert Interviews

Interviews were held with experts from various sectors and branches to verify and complement the literature-based findings. Focused expert interviews (Merton et al. 1990; Yin 2009) with partly standardized interview guidelines were chosen as a suitable qualitative research method (Klein and Myers 1999). The experts were asked several closed-ended questions and several open-ended questions.

The search to identify experts mainly focused on conferences and expert forums. It was expanded further by identifying specialized consulting and enterprise portal companies. One hundred fifty experts were found using this approach, all of whom work in the industry. In total, 31 representative experts from various sectors and branches were interviewed. The chosen sample is considered representative because the people were selected at random and work in different sectors and in different positions. Table 2 provides an overview of the interviewees.

Table 2. List of Interviewed Experts		
No.	Position	Branch
1.	Consultant processes logistic and organization	Engineering
2.	Manager IT-architecture	Finance
3.	Portal Lead Human Resources	Software

4.	Consultant	Consultancy
5.	Manager IT	Retail
6.	Researcher	Public Sector
7.	Manager Service	Media
8.	Managing director	IT - Consultancy
9.	Senior manager Global Web Platforms	Telecommunications
10.	Partner - marketing, sales, services	Management consultancy
11.	Managing director	IT - Consultancy
12.	Managing director	Consultancy
13.	Managing director	Software
14.	Director information management	Pharmacy
15.	Quality manager	IT - System integrator
16.	Head of knowledge & quality management	Consultancy
17.	Knowledge manager	Aerospace
18.	Presales manager	Software
19.	Managing director	Internet
20.	Senior consultant	Consultancy
21.	Consultant	Consultancy
22.	Portal and intranet manager	Insurance
23.	Director strategy consumer & devices	Hardware
24.	Chief executive officer	Retail
25.	Senior sales manager	Software
26.	Researcher	Research
27.	Information services manager	Health insurance
28.	Process manager	Logistics
29.	Managing consultant	Consultancy
30.	Senior consultant	Consultancy
31	Director sales	Software

Consolidated Results: Literature Review and Expert Interviews

Eighteen critical success factors were identified using the literature analysis and expert interviews. Fourteen of the eighteen success factors mentioned by experts during the interview were also named in the literature as critical success factors. These 14 critical success factors, which were first identified in the literature analysis, could then be confirmed via expert interviews. The other four success factors (defined processes and process orientation, definition of goals and linking to corporate objectives, definition of a strategy for the portal and the knowledge management system, and stable knowledge structures) were not mentioned by the experts, but should also be taken into account as critical success factors.

A total of 17 challenges were identified using the literature analysis (e. g. Davenport and Prusak 1998; Heisig and Vorbeck 2001; Jennex and Olfman 2005; Ruggles 1998; Remus 2006) and the expert interviews. Seven of the 17 challenges that were mentioned by experts during the interview are also named in the literature as challenges. While the codification of knowledge, making that knowledge available and the definition of processes for knowledge work were named as challenges in the literature, experts emphasized aspects of usability, content and the special role of corporate management or the promoter that drives a project forward.

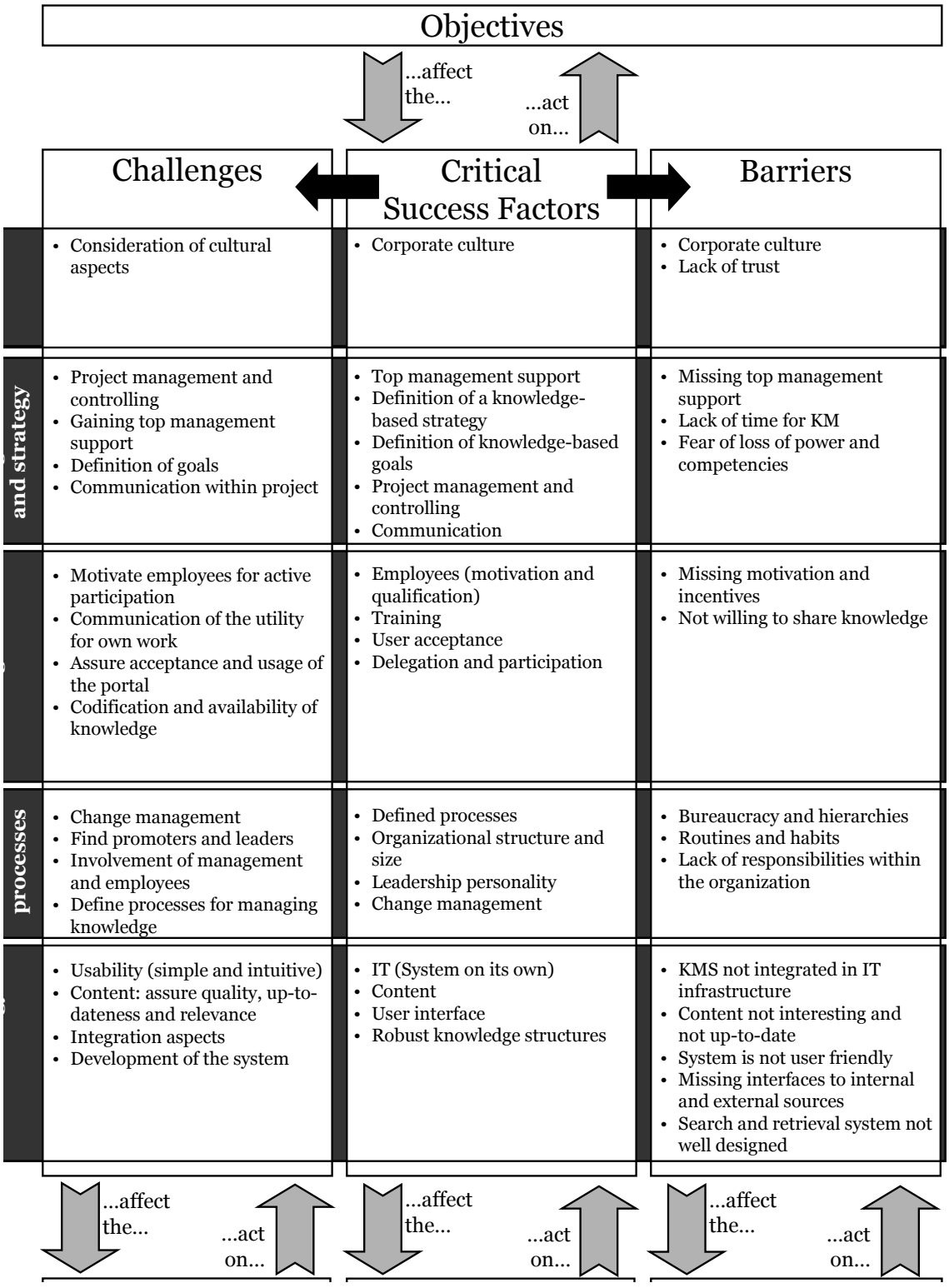

Figure 2. Identified Critical Success Factors, Challenges and Barriers

A total of 15 barriers could be identified using the literature analysis and expert interviews. It became clear that achievement of the central objectives was endangered by these barriers. Both promotion of acceptance and motivation toward active participation were significant objectives in introducing portal-based knowledge management. Achievement of this goal is endangered when there is a lack of motivation or a lack of interesting content in the portal or if the system is not user friendly.

Based on this, recommendations for action were developed in the form of measures or measures of influence that demonstrate how challenges can be overcome, and critical success factors taken into consideration while overcoming barriers. In the next chapter, these measures are discussed for each phase as part of the development framework for the process model for introducing portal-based knowledge management.

In previous studies (e. g. Davenport and Prusak 1998; Heisig and Vorbeck 2001; Jennex and Olfman 2005; Remus 2006), a number of critical success factors were identified. However, the measures available for exerting influence on the critical success factors are of special interest for the project stakeholders. The central point of interest is the activities that promise the highest level of use for knowledge management. These were developed for each success factor and are then taken into account during development of the process model. The consolidated results are shown in Figure 2.

In previous studies and investigations, critical success factors were only listed separately. However, there are interdependencies between the individual factors. These interdependencies were also examined. Within the framework of investigation, the interrelationship between the individual factors was determined and an integrative view of the success factors, challenges and barriers was taken.

This integrated view resulted in the realization that there are success factors that present both a challenge and, in a more negative case, a barrier (Figure 3).

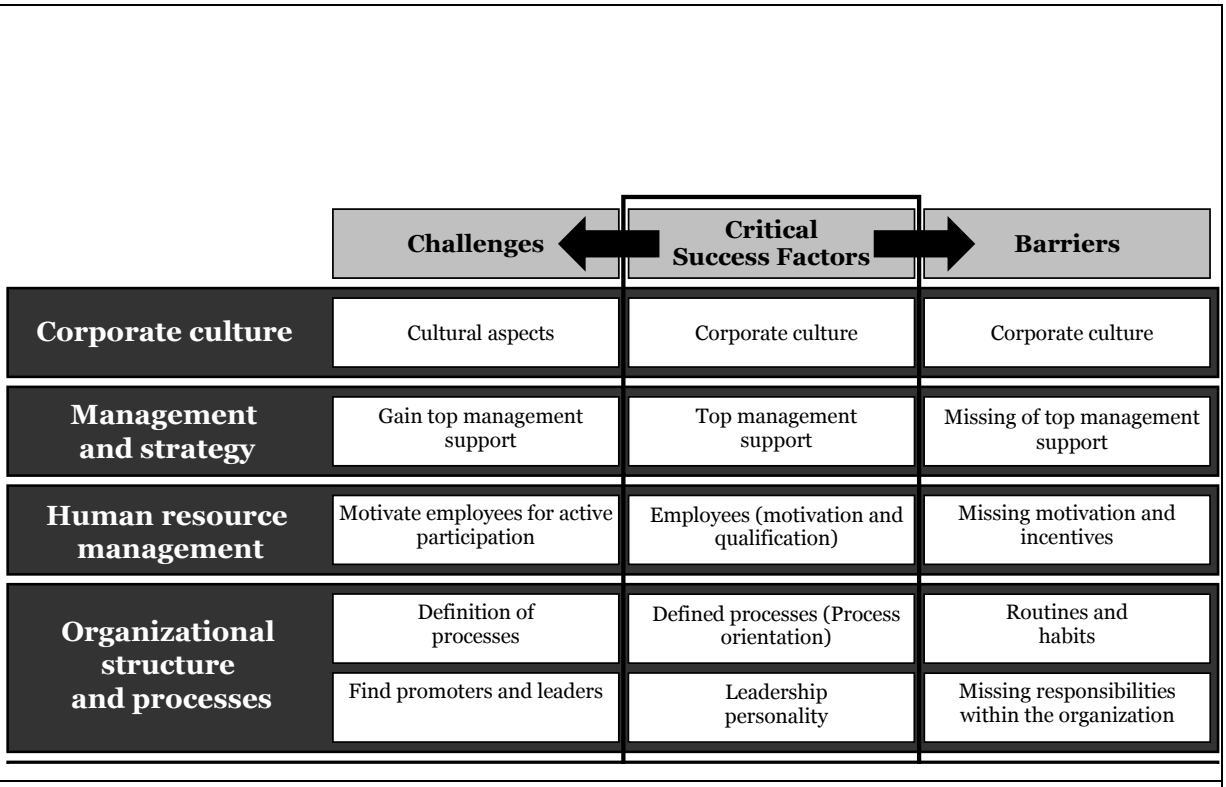

Figure 3. Integrative Consideration of Critical Success factors, Challenges and Barriers

In this way critical success factors as well as relevant challenges and barriers could be identified in the context of portal-based knowledge management.

Implications: Towards a Process Model for Implementing Portal-based Knowledge Management

There are already a number of reference and process models in the literature (Collins 2003; Firestone 2003; Mertins et al. 2003; Remus 2006; Wiig 1999) that describe how to implement knowledge management or portals. To differentiate our research from these, we refer to the critical success factors, challenges and barriers identified in the previous chapter and derive objectives, milestones, tasks, and deliverables based on those. Knowledge management may not be viewed as a unilateral problem of technology, culture, coordination, leadership or reorganization. Rather it entails design and links all of these functions and areas. The only way to make full use of the potential success of knowledge management is to take all areas into account, together with the interfaces and interdependencies among them. To avoid isolated applications, uniformity of systems and integration into existing processes must also be considered. The model in the next section comprises the following phases to reflect the chronological course of an implementation project (Figure 4):

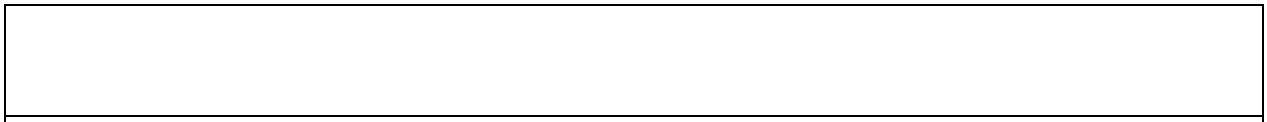

Figure 4. Chronology of an Implementation Project

Overview of the Process Model for Introducing Portal-based Knowledge Management

In the initialization phase, the strategy and objectives for portal-based knowledge management are defined, as is the project itself. In Phase 1, a project must result from the idea of implementing portal-based knowledge management. Before that, it must be ensured that the corporate culture of the organization allows and supports knowledge management. If this proves to be the case, first a vision to campaign for the project among top management must be developed. A strategic concept can be derived from this vision, in which, objectives for portal-based knowledge management can be defined. A plan with milestones for implementation of this vision should also be part of this strategic concept. It is also necessary to come up with a cost-benefit analysis during this early phase in order to obtain the necessary budget from top management.

The as-is analysis, the detailed analysis of requirements and the economic potential are performed in the analysis phase. Originating from the developed knowledge management strategy and based on the project definitions, in Phase 2, the as-is status with regard to the knowledge portal to be implemented and the areas linked to it should be determined. Furthermore, relevant requirements should be identified and their economic potential proposed. Thus the following deliverables should be provided:

- An as-is analysis document
- A list of requirements document
- An economic potential document (cost-benefit analysis)

In the conception phase document, the requirements specification, the mandatory specification, the functional design, and the IT design are created. In Phase 3, the knowledge portal to be implemented is modeled. Based on the requirements, the requirements specification and the mandatory specifications are created, and these are used to select the appropriate software. Another objective of this phase is determining the functional design and the IT design. The following deliverables have to be achieved:

- A requirements specification
- A mandatory specification
- Portal software
- A functional design
- An IT design

In the realization phase, the designed solution is implemented. In Phase 4, the concepts developed during the conception phase are implemented. For this purpose, a development and test environment is required. This is used as a platform for developers and testers. By creating a prototype, an executable solution can be presented early on in the process. In addition to implementing the portal software, the first task is migrating content and training users. The following deliverables have to be achieved:

- An executable prototype
- Installed, adapted portal software
- Implemented, tested system
- Migrated content
- Training documentation and trained users
- A communication plan
- An implementation concept and roll-out of the system

Once the system has gone into productive operation, it should still be accompanied by the project team as part of the implementation phase. An overlapping objective of Phase 5 can be defined as having all participating employees work on the knowledge portal. Furthermore, lessons learned project documentation should be created and passed on to the support department. When the system is handed over to the operations or support department and the project team is debriefed, both this phase and the overall implementation project are completed. To reach these goals, the following deliverables have to be achieved in Phase 5:

- Project documentation, project results and lessons learned
- Migrated content and integration of other content
- Target-group-specific training documentation
- Change management
- Transfer of operations

In summary, a phase-based process model can be developed with tasks, milestones, and deliverables. This model is based on existing process models and includes specifics of knowledge portals and takes factors into account such as the migration of existing content. Figure 5 provides an overall picture of the objectives, deliverables, tasks, milestones and tools for each phase, as well as the overlapping tasks are presented as an overall picture.

While the process model has more of a project character and a high level of abstraction, in the next section, we will describe how the critical success factors can be taken into account in the individual phases, and which measures can be used to affect them in each time period to ensure that the implementation of portal-based knowledge management runs successfully.

For this dimensional view of the critical success factors and the measures of influence, each of the critical success factors identified in chapter 3 is assigned to the measure in each phase that influences it. Measures of influence that overlap between phases are shown with an arrow in the overview graphic. The results of the expert interview regarding measures for promoting acceptance and use are also be taken into account in the respective phases.

Consideration of the Identified Critical Success Factors and Measures of Influence in the Process Model

Due to the complexity of portal projects, successful implementation is only successful when critical success factors and the methods that affect them are continually observed and checked by the project team from the beginning. The five closely interrelated, interactive dimensions, which are corporate culture, corporate leadership and strategy, human resource management, organization and processes and information technology are to be included. The classic project phases are to run at the same time.

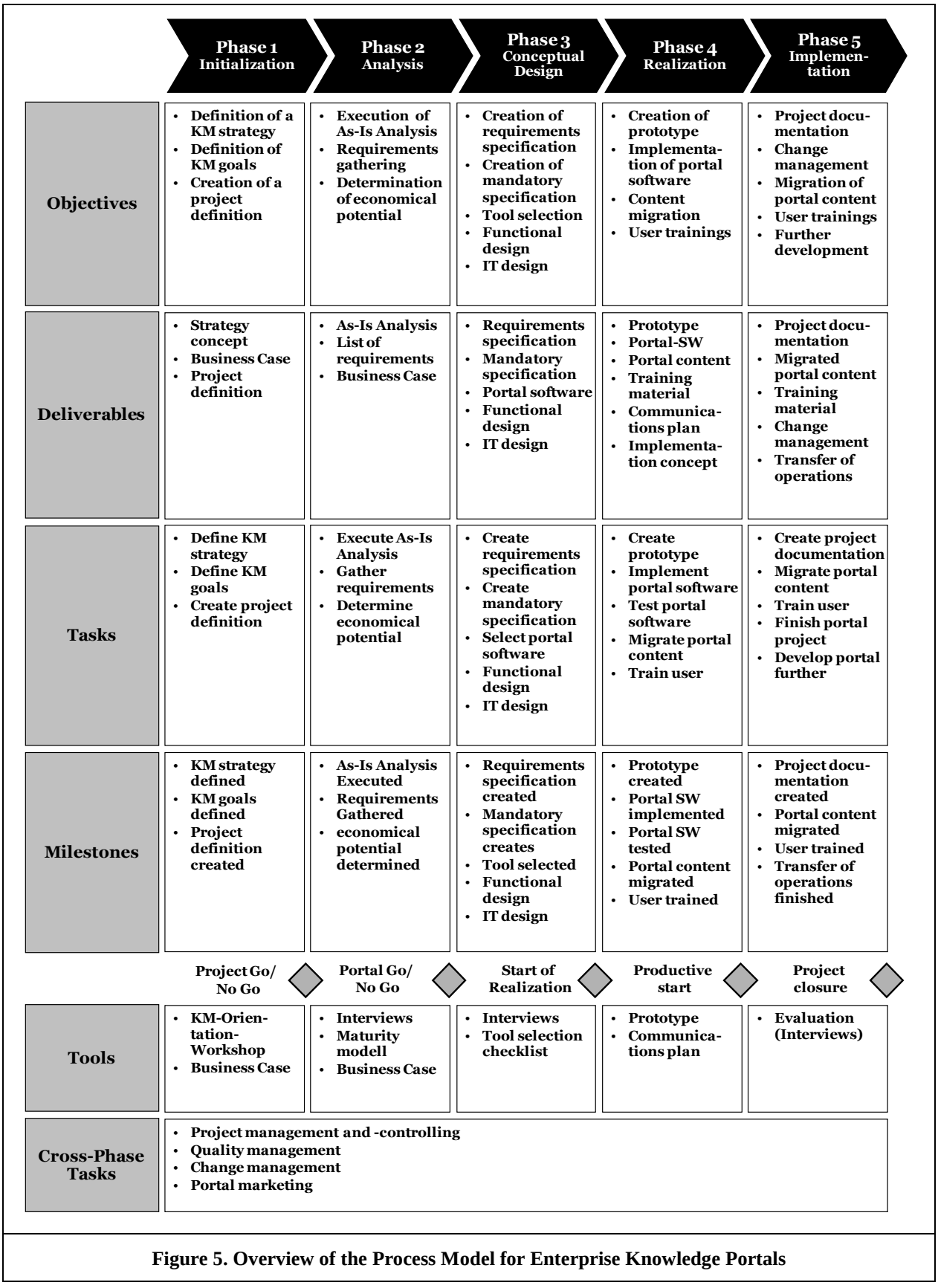

Figure 5. Overview of the Process Model for Enterprise Knowledge Portals

The combination of the two grids provides both a view of the individually relevant factors and measures, and a general overview (Figure 6).

The results and knowledge gained from this study are used to provide an overview of the critical success factors and measures of a portal project. This approach reduces the otherwise high level of complexity and facilitates taking these factors into account, both individually and together, and to design them successfully. The image provides a general overview and should be applicable to various portal projects. In individual cases, other critical success factors should be taken into account by dimension, which is why a suitable analysis is absolutely necessary for the specific portal project. This figure can be used to determine in which phases which measures are important in which phases and thus should be implemented.

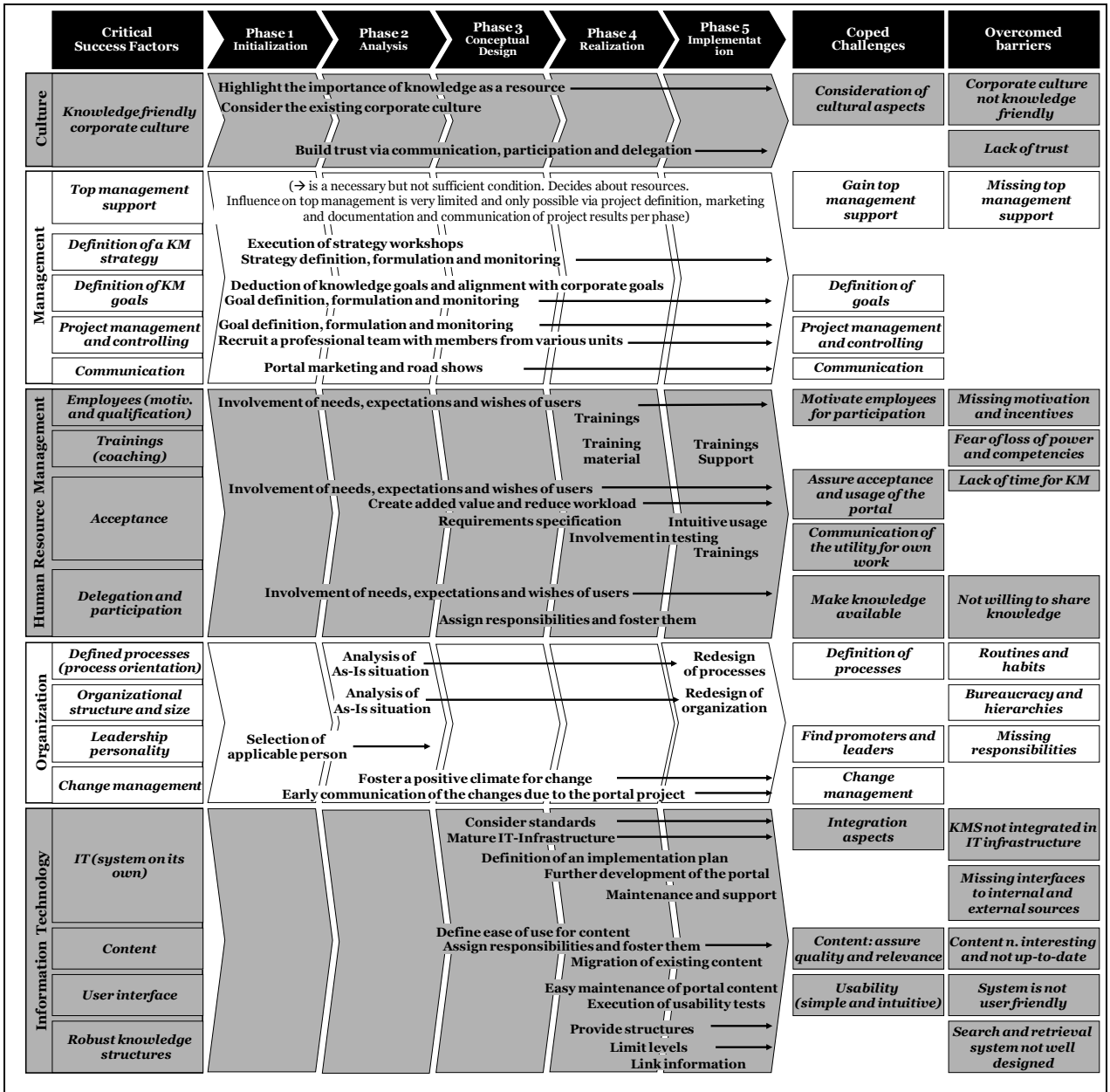

Figure 6. Phasal View of the Critical Success Factors and Measures of Influence

Figure 6 provides an extensive overview, which can help with successful implementation of portal-based knowledge management. The schematic representation helps users control resources usefully in connection with the project. It also illustrates which measures are relevant for each dimension and phase. The results shown here could be helpful in creating a checklist for planning and controlling portal projects and to mitigate potential risks while implementing the portal.

Conclusions and Outlook

This paper analyzes the state of the art in portal-based knowledge management and develops a process model for its successful implementation. We analyzed the existing reference and process models in the environment of portal-based knowledge management, and found that reference and process models do exist for the implementation of knowledge management and portals separately, but that there is no complete model for the implementation of portal-based knowledge management as a whole. We also determined that up to now, there has been no consideration of the critical success factors for the various reference and process models. In order to develop a process model, and to take the critical success factors into account and provide relevant, practicable action and design recommendations, we performed a literature review and interviewed experts. The critical success factors and the process model illustrated in this paper are substantiated and can be used to support successful implementation projects for enterprise knowledge portals.

This paper contains several new contributions to the research field and answers our two research questions (cf. Introduction):

1. Which critical success factors, challenges and barriers exist in the introduction to portal-based knowledge management?

The initial research question could be answered by comparing the results of the literature analysis and the expert interviews. A total of 18 critical success factors, 17 challenges and 15 barriers are identified and presented within this paper. They must be taken into account while introducing portal-based knowledge management. Figure 2 provides an overview of these.

2. How can the previously identified critical success factors, challenges and barriers be considered in a process model for implementing portal-based knowledge management?

Beyond that, we determine how the previously identified critical success factors and resultant challenges and barriers can be considered in a process model for implementing portal-based knowledge management. Specific measures can be taken during the individual phases for each critical success factor to ensure that the investigation was extensive enough. The second research question is first made concrete when a model is developed for the implementation of portal-based knowledge management. Figure 6 shows these measures for each phase and indicates which challenges can be conquered and which barriers overcome once the measures are implemented.

In order to meet the requirements of today's information and knowledge-based society, companies need to take fundamental steps to adapt. This paper illustrates that corporate portals have the potential to become the central technical platform for knowledge management activities within enterprises and organizations. Currently they appear to be the best approach to dealing with ever-increasing requirements, such as HR self services, integration of Web 2.0 applications and social software, service-oriented architecture and mashups. Some experts emphasize that communities, social software and networking can increase acceptance and use of portals in a corporate environment.

Portals will continue to play an important role in support of knowledge management over the mid and long term, because they are the only way of integrating various applications, bundling and consolidating various sources of information and storing knowledge, and providing a user-oriented view of roles and personalization.

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