THE DIFFICULTY OF FINDING EXPERTS
Implementation Process of Corporate Yellow Pages

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Abstract: Knowledge management (KM) has often been identified as one of the most important challenges for sustained organizational success. A number of theoretical models and practical projects to improve KM have been developed, but were unsatisfactory and took a general approach while neglecting a specific implementation process for KM. This paper presents a systematic implementation process for a KM initiative based on a needs analysis, which was conducted in an international biotechnological company. The implementation process comprises three phases: Diagnosis of KM problems and goal setting of a specific intervention; design and development of this intervention; and rollout of the intervention. The phases comprises three empirical studies: a needs analysis (study 1), a study on design and development (study 2), and an effect analysis after the rollout (study 3). Results of study 1 show that there are needs for improving the documentation, communication and utilization of knowledge about specific expertise of individual employees and experiences with projects. To fulfil these requirements it was decided to design and develop an expert finding system "corporate yellow pages" (study 2). Finally the paper will give an outlook on the effects of corporate yellow pages concerning the utilization, acceptance, individual and organizational effects (study 3).

1 INTRODUCTION

Knowledge management (KM) has often been identified as one of the most important challenges for sustained organizational success and as a prerequisite for productivity and flexibility of corporate and non-corporate organizations. Due to the global interconnectedness of markets today, the scope and quality of individual employees' knowledge have taken their place alongside more traditional organizational resources such as work and capital. Knowledge is now viewed as a key contributor to an organization's competitive advantage. Therefore it is necessary to explicitly plan and manage the development, consolidation, representation and application of knowledge of organizations and individuals. As a consequence of the growing importance of knowledge, a number of theoretical models and practical projects to improve knowledge management (KM) have been developed in recent years (Schwartz, 2006).

However, many of these efforts were unsatisfactory and many expectations put into KM initiatives could not be met in practice. One explanation for these shortcomings is that previous efforts often took a general approach while neglecting a specific implementation process for KM. Moreover, only few KM projects consider how to systematically proceed in the context of improvement and implementation processes from existing needs in an organization. Introducing innovations in organizations is seldom unproblematic. In many cases, the purpose of introducing a new concept, such as a KM initiative, is unclear, too abstract or too generally formulated. Consequently, new developed tools are often doomed to failure from the outset due to the fact that there is no adequate target group for utilization or it fails to win the intended users' acceptance. One reason is that many innovations do not meet the actual needs of employees (Akhavan et al., 2005; Chua and Lam, 2005).

To overcome these shortcomings this paper presents a systematic theoretically and empirically based implementation process of a KM initiative in a specific area of application which was conducted in

an international biotechnological company. The implementation process comprises three main phases that complement each other. Phase 1 consists of a diagnosis of knowledge management problems and goal settings of a specific intervention; phase 2 is concerned about the design and development of this intervention; and in phase 3 the rollout of the intervention takes place. The process with its three phases is driven by three empirical studies (Winkler and Mandl, 2007) (see figure 1).
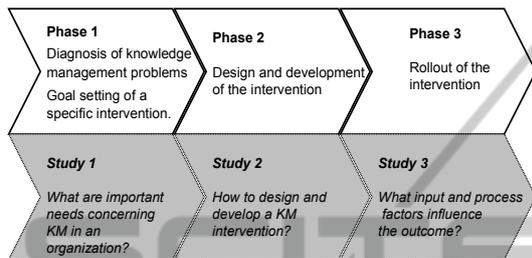

Figure 1: Implementation process with according studies.

The implementation study was conducted in the Research and Development (R&D) department of an international biotechnological company. The management recognized a general need concerning knowledge exchange within the company due to the regionally wide distributed sites of the R&D department. As a consequence of a number of recent company mergers, there were two R&D sites in Germany, one in Switzerland, two in the United States and one in Australia, resulting in the problem of improving the company's KM.

According to the phases three studies are presented. The first study analyzed differentiated needs for improving KM in the R&D department to derive more explicitly needs-driven KM initiatives from this differentiated perspective (study 1). Subsequently, it was decided to develop a needs-oriented KM intervention, an expert finding system, to pursue organizational needs (study 2). This KM initiative is especially profitably for organizations that are distributed geographically as in our case study, where it is less likely to communicate face-to-face as it takes place on usual forms of interaction among employees (Frappaolo, 2006). A third study will evaluate the effects and outcomes on utilization, acceptance, individual and organizational effects of the expert finding system (study 3).

2 STUDY 1: WHAT ARE IMPORTANT NEEDS CONCERNING KM IN AN ORGANIZATION?

2.1 Theoretical Background

From a theoretical viewpoint, it is important to differentiate different process categories of KM. According to the Munich Knowledge Management model these central dimensions are (1) knowledge representation, (2) knowledge communication, (3) knowledge generation, and (4) knowledge utilization (Reinmann- Rothmeier et al., 2001).

(1) Knowledge representation describes processes which make knowledge transparent. These include identification, preparation and documentation, storage and updating of knowledge. Important aspects in this context are databases, knowledge cases, and information strategies within an organization. The main goal of knowledge representation is to present knowledge in a way which facilitates transfer, exchange, maintenance and utilization of knowledge at the organization.

(2) Knowledge communication includes all processes and methods for sharing and disseminating knowledge within the company. On an organizational level, this broaches the issue of incentives and career structures, which may promote or hinder the dissemination of knowledge, and the use of technical support tools such as intranet, E-mail or business TV.

(3) Knowledge generation comprises activities for knowledge acquisition, for the creation of specific knowledge resources, and for the generation of personal and technical knowledge networks. Pre-manufacturing, as well as research and development departments often play a primary role in the generation of knowledge on the organizational level, while further education and training is crucial on the individual level.

(4) Knowledge utilization includes processes such as the use of knowledge in managerial decisions, or transformation of knowledge into products and services. Only knowledge which previously has been represented, communicated and generated, can be applied in practice, either on an organizational or individual level.

2.2 Research Question

The differentiated approach takes into consideration needs configurations in regard to different KM

dimensions. Accordingly, the main question of study 1 was: To what extend is there a need for improving KM in the R&D department of the organization regarding (a) knowledge representation, (b) knowledge communication, (c) knowledge generation, and (d) knowledge utilization?

2.3 Method

After a preparatory qualitative pre-study, which comprised interviews with managers of the organization, 163 employees from different sites of the research and development (R&D) department answered an online questionnaire on their needs for KM. There were specific questions concerning the actual state of the four knowledge management domains: knowledge documentation (22 items), knowledge communication (14 items), knowledge generation (9 items), and knowledge utilization (12 items).

2.4 Results

Central results will be presented below.

(a) In regard to knowledge documentation the most important need was identified for improving documentation on the specific expertise of individual employees (as suggested by 47.3% of the respondents). Moreover, respondents identified a number of needs for improving the documentation of experiences with projects (45.9%), or with external cooperation partners (42.5%).

Table 1: Main results knowledge documentation.

	n	No	Neutral	Yes
Knowledge is sufficiently documented in regard to knowledge about **specific expertise** of individual employees	146	47,3%	33,6%	19,2%
Experiences with **projects** are sufficiently documented.	148	45,9%	35,1%	18,9%
Experiences with **external cooperation partners** are sufficiently documented.	127	42,5%	37,8%	19,7%

Note: „no"= answers 1 or 2; „neutral"= answer 3; „yes"= answers 4 or 5

(b) Referring to **knowledge communication**, respondents indicated that there are no appropriate opportunities for knowledge communication (38.2%) and for networking with relevant colleagues (38.1%) and that there is no sufficient knowledge exchange (36.7%).

Table 2: Main results knowledge communication.

	n	No	Neutral	Yes
There are appropriate opportunities for **knowledge communication** between different company sites.	136	38,2%	39,0%	22,8%
I have sufficient opportunities for **networking** with relevant colleagues at other sites.	134	38,1%	40,3%	21,6%
Relevant knowledge is sufficiently **exchanged** between this site and other company sites.	139	36,7%	42,4%	20,9%

Note: „no"= answers 1 or 2; „neutral"= answer 3; „yes"= answers 4 or 5

(c) In respect to **knowledge generation**, according to the respondents the only specific aspect which needed improvements was to create more opportunities for acquiring new knowledge by job rotation (68.6%).

(d) Finally, concerning **knowledge utilization**, respondents indicated that there are no standard operating procedures for using existing experiences (50.4%) or knowledge (45.9%). Furthermore the respondents stated that documented knowledge (28.4%) or previous experiences (30.0%) are not always used adequately in new projects.

Table 3: Main results knowledge utilization.

	n	No	Neutral	Yes
There are standard operating procedures for using existing **experiences**.	133	50,4%	29,3%	20,3%
There are standard operating procedures for using existing **knowledge**.	135	45,9%	30,4%	23,7%
Previous experiences are always used adequately in **new projects.**	140	30,0%	42,1%	27,9%

Note: „no"= answers 1 or 2; „neutral"= answer 3; „yes"= answers 4 or 5

2.5 Consequences

The outcomes of the needs analysis study allow a differentiated view of KM needs in the R&D department. In particular, the specific analysis of needs in regard to different KM dimensions revealed that there is an explicit need for improving knowledge documentation, above all *knowledge about specific expertise of individual employees and experiences with projects and external cooperation partners*. Moreover there was a need for improving knowledge communication in particular

opportunities for exchanging and networking with employees from other R&D sites. Furthermore there was a need to improve knowledge utilization, especially the *use of knowledge and experiences in new projects*. To meet these needs, it was decided to develop and implement a "corporate yellow pages" expert finding system as an initial improvement project. Corporate yellow pages are an optimal KM intervention to encourage aspects of knowledge documentation, above all *knowledge about specific expertise of individual employees and experiences with projects and external cooperation* by creating profiles of employees and documenting their expertise knowledge, experiences or networks. Regarding knowledge communication, especially *opportunities for exchanging and networking with employees from other R&D sites*, corporate yellow pages give the opportunity to search for experts and to interact between employees by exchanging knowledge and experiences. Knowledge utilization, like the *use of knowledge and experiences in new projects* is supported by corporate yellow pages while exchanging knowledge between experts, expert knowledge and experiences into new projects are transferred.

All in all the needs analysis study took about three months from starting the project to the evaluation of results.

In the following details of the design and development of the planned corporate yellow pages will be presented in study 2.

3 STUDY 2: HOW TO DESIGN AND DEVELOP CORPORATE YELLOW PAGES AS A KM INTERVENTION?

3.1 Theoretical Background

Expert finding systems (aka corporate "corporate yellow pages") are considered to be an effective and less time-consuming instrument to support above all knowledge communication in organizations (Probst et al., 2010).
Corporate yellow pages aim to assist users in finding experts with specific knowledge, competencies, or experiences within the company. They cover the specific knowledge of all relevant organizational members, independently of their position. They are expected to help members of large, often widely geographically dispersed organizations, in finding out who has specific expertise in a problem area.

This is essential for finding support in complex problem solving situations, or for getting critical knowledge for making decisions.

Supporting people by finding required knowledge is essential for a successful KM system. Expert finding systems can stimulate exchange and learning processes in the organization (Lehner, 2008). Other potential advantages which are often mentioned in the literature can be the visibility of expert knowledge to all employees, the development of communities of experts, and the quickness of support from relevant experts. Accordingly, expert finding systems are expected to advance information seeking for work processes and knowledge development.

Another important factor is the encouragement of exchanging knowledge and experiences, thus giving employees the opportunity to transfer implicit knowledge into explicit knowledge (Eppler, 2003). The exchange between experts by means of an expert finding system can be a chance to exchange tacit knowledge (Polanyi, 1966) in a highly situated context between employees.

Potentially adverse effects can result if unauthorized users have insights into a corporate yellow pages system. Furthermore there is risk of information overload, misconstruction and out-of-datedness (Eppler, 2003).

The results of empirical research on factors relevant for conceptualization, realization, and success of expert finding systems are not entirely conclusive. Nevertheless, a number of factors in regard to content, organizational, and technical aspects can be identified.

3.2 Conceptualization of Corporate Yellow Pages

3.2.1 Content Aspects

The core and main component of corporate yellow pages are employee's profiles (Idinopulos and Kempler, 2006). The goal of these profiles is to give the intended searcher a basis of decision-making, whether someone is an adequate expert for a problem definition or not. Moreover profiles are the basis for knowledge communication, which should be initiated through the use of corporate yellow pages (Lin et al., 2008).

Content aspects comprise the kinds of information which a single corporate yellow pages profile can consist of.
- **Contact Details:** How to contact an expert is a trivially, yet essential content for yellow page entries (Woudstra and Van den Hooff, 2008).

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- **Knowledge:** Each employee's knowledge is also an essential aspect, as without knowing what someone else knows it is not possible to find a person with specific expertise (Cross et al., 2006). Knowledge types which can be relevant include technical knowledge, experiential knowledge from previous projects, as well as knowledge on research, products, or customers.

- **Domain of Knowledge:** To facilitate searching for experts in specific knowledge domains, it may be important to predefine a closed set or taxonomy of knowledge domains relevant for the organization (Helm et al., 2007). However, it is important to limit the number of predefined domains (Lehner, 2008) and keep them flexible for future additions

- **Quality of Knowledge:** In addition to knowledge types and topics, information on the validity, credibility, or soundness of the expert's knowledge may be an important element of a person's entry (Woudstra & Van den Hooff, 2008).

- **Up-to-dateness:** Including information on how recently an entry has been checked for being up to date helps in rating the entry (Woudstra & Van den Hooff, 2008).

3.2.2 Organizational Aspects

Organizational aspects refer to the structures, processes, and rules associated with the expert finding system in the organization.

- **Voluntariness:** Entry of one' own profile should be voluntary. Participation in the system should reflect a sincere readiness to exchange knowledge and to support one's colleagues (Hofmann et al., 2010).

- **Motivation:** Motivation of employees is fundamental for a successful implementation of corporate yellow pages. Motivational measures could be a transparent and comprehensive communication strategy, measures of qualification, management support, as well as participation of employees (Finke & Will, 2003).

- **Bottom Up Entry:** Entries and updates of personnel profiles within the corporate yellow pages system should be entered by employees themselves, as they are the ones who are most competent to do so (Lehner, 2008).

- **Organizational Climate:** Trust and responsible handling of entries are important aspects for dealing with corporate yellow pages (Lehner, 2008; Soliman and Spooner, 2000).

- **Support from Top Management:** Support from management is crucial for the success of knowledge management as they are providing time to employees for exchanging knowledge; as they are allocating sufficient budget for implementing knowledge management; as they are introducing

"new mindset" and acting as example by filling out their own profile in the system and as they are giving priority to knowledge management (Helm et al., 2007).

- **Participation:** Employees are informed about the implementation processes and included in decision-making processes (Helm et al., 2007).

3.2.3 Technical Aspects

Technical aspects refer to design features of the hard- and software of the platform used to realize the expert finding system.

- **Accessibility:** Knowing what someone else knows is only useful if there is a prompt access to this information (Woudstra and Van den Hooff, 2008).

- **Usability:** Requirements which are important for optimizing the usability of the system include perceptibility, operability, intelligibility, and sustainability (Stapelkamp, 2007).

- **Design:** Fundamental design aspects to be considered are perception, colour, typography, orientation, navigation, layout, style guide, and screen and information design (Stapelkamp, 2007).

- **Safety:** Security precautions have to be taken to avoid misuse by external knowledge transmission or even headhunting of important employees (Lehner, 2008).

Before developing corporate yellow pages, it is fundamental to analyze the specific needs for such a system, and to make sure that there are appropriate context conditions in regard to content, organizational and technical aspects. The goal is to ensure that the new tool is relevant for everyday workplace activities, that it finds the intended users' acceptance, and subsequently is used by employees. In this context, it is evident that a comprehensive procedure for a purposeful and acceptance-oriented implementation must precede an introduction of the expert finding system. This procedure should concentrate on the needs of the end user in order to actually contribute to the optimization of their business processes.

According to this, a kick-off workshop was organized for discussing the goals of the expert finding system as well as for building a task force responsible for managing the overall project. Subsequently a design analysis study was conducted with employees in the R&D department to learn about the specific needs concerning content, organizational and technical aspects for conceptualization and design of the planned expert finding system.

3.3 Research Questions Concerning the Design and Development of Corporate Yellow Pages

(a) What content, organizational, design-related and technical aspects should be considered for the design and development of corporate yellow pages?

(b) How user-friendly are the developed corporate yellow pages?

3.4 Method (Question a)

35 organizational members (senior managers, managers, knowledge managers and employees), from different R&D departments were interviewed on questions of content, organizational, design-related and technical aspects concerning their needs of an expert finding system.

3.5 Results (Question a)

Respondents confirmed the urgent need for an expert finding system. Concerning **content questions** respondents spoke in favour of following aspects that should be considered in corporate yellow pages: contact details (N=24), experiences with projects (N=20), knowledge domains of R&D expertise (N=19), qualifications (N=17), work experience (N=17), experiences with products (N=11).

In regard to **organizational aspects** 8 of 35 respondents mentioned that the entry should be voluntary, 7 respondents were for obligatory entry and 5 for a combination of both. 16 respondents were in favour of each employee should update his profile himself. To ensure the acceptance of corporate yellow pages, there were also collected suggestions concerning *conditions, measures* and *incentives*. Regarding *conditions* respondents mentioned: support by manager (N=14), communication measures (N=13), usability (N=10) and company-wide introduction of corporate yellow pages (N=9). As adequate measures for the success of corporate yellow pages respondents named trainings (N=9) and the function of a knowledge manager (N=6). 6 respondents were against incentives.

Beside this respondents mentioned also some obstacles that could influence the success if corporate yellow pages: time-consuming (N=8), complicated handling (N=7) or not enough communication measures from management (N=4).

Finally, in regard to **technical questions**, specifications for the technical implementation and user interface design could be clarified, for example

9 respondents mentioned that SharePoint could be suitable. Concerning the search form, respondents (N=15) preferred a combination of search functions, keyword search and searching by categories.

3.6 Conclusion (Question a)

Results of the design analysis give essential information about the needs of employees concerning corporate yellow pages and serve as a central basis for the conceptualization. The selection of content, organizational and technical aspects was chosen according to the amount of mentions of respondents and discussions in-between the task force.

Concerning the **content concept** following main content fields will be integrated in corporate yellow pages: Contact details; expert knowledge in R&D, developed products, current product development projects, networks and qualifications.

In regard to the **organizational concept** it was decided that all entries should be voluntary except of contact details. This decision point was strongly related to the claims of the works council. Moreover to ensure the acceptance of corporate yellow pages managers are obligated to support their employees concerning the utilization of corporate yellow pages (e.g. giving more time for utilization) and to carry out communication measures (e.g. company wide introduction). To give opportunities for getting practical knowledge about the handling of corporate yellow pages trainings and tutorials are planned. According to employees no incentives will be integrated besides striving for the usefulness of corporate yellow pages.

Relating to the **technical concept**, a technical workgroup of R&D members and external consultant are working in collaboration for designing and developing corporate yellow pages. As system basis a customized SharePoint will be implemented, including different ways of search functions. Furthermore usability tests are implemented to grant a user-friendly system.

3.7 Methodological Procedure (Question b)

The study concerning the user-friendliness of corporate yellow pages analyses in a first step the functionality according to specific content, organizational and technical aspects. In a second step after the technical development of the expert finding system which is currently under process there will be analyzed the usability in a multi-evaluation model. Usability is a quality attribute

assessing the simpleness in dealing with user interfaces. Usability is defined by several quality components: learnability, efficiency, memorability, errors, satisfaction or utility (Nielsen, 1994).

Four task force members will analyze the functionality of content, organizational and technical aspects according to the conceptualization and the usability of corporate yellow pages individually by a checklist and will summarize the results in a discussion round. Based on their feedback, the technical workgroup will update the expert finding system.

In the pilot study will take place a diagnostic and performance evaluation with intended users. 10 organizational members from R&D department will test the usability of corporate yellow pages through the thinking aloud method with task scenarios followed by a usability test through a questionnaire (based on QUIS and IsoMetrics). The QUIS (Questionnaire for User Interaction Satisfaction) was designed to assess users' subjective satisfaction with specific aspects of the human-computer interface. It includes specific *interface factors* like screen factors, terminology and system feedback and *learning factors* like system capabilities, technical manuals, on-line tutorials, multimedia, teleconferencing, and software installation (Chin et al., 1988). IsoMetrics is a user-oriented approach in software evaluation based on ISO 9241 Part 10 including seven dialogue principles: suitability for the task, self-descriptiveness, controllability, conformity with user expectations, error tolerance, suitability for individualization, and suitability for learning (Gediga et al., 1999).

After the tests again the technical workgroup will revise the expert finding system and then it will be launched in the whole R&D department.

The implementation study required a timeline of about a year including the conceptualization, technical development and implementation, development of acceptance and communication strategies as well as revise sessions of the system.

4 OUTLOOK STUDY 3: WHAT INPUT AND PROCESS FACTORS INFLUENCE THE SUCCESS OF CORPORATE YELLOW PAGES?

After the rollout of corporate yellow pages a comprehensive and systematic evaluation should take into consideration the entire chain of effects from the initialization of the implementation process to the final impact of the intervention (see figure 2).
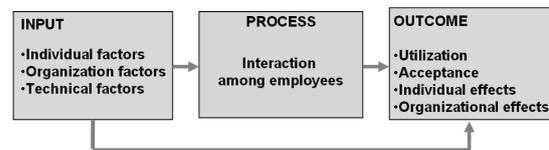

Figure 2: Design of evaluation.

In doing so different evaluation activities may refer to three main components:

(1) **Input Factors** comprising *individual factors* as motivation, willingness and job relevance; *organizational factors* as infrastructure of KM which results from the implementation process including attitude of management, support measures or organizational culture and *technical factors* as design and usability.

(3) **Process Factors** including any KM *process* due to the intervention for example interaction among employees.

(4) **Outcome Factors** referring to the *utilization* as quality of support or frequency; *acceptance* of attitude and behaviour; *individual effects* as time saving, problem solving or increase of employee and customer satisfaction; and *organizational effects* like improvement of decision-making processes, improvement of product developments and project realizations, reduction of mistakes or cost savings (Hanley and Malafsky, 2003; Tiwana, 2000).

In focus of interest are also potential relationships between these effects, and what the single factors and processes contribute to the intended outcomes. An important goal will be the formative improvement of infrastructure and implementation of KM for optimizing effects.

Relevant research questions will be (Hense and Mandl, 2010):

- What role does the infrastructure play for processes, outputs and outcomes of KM?
- How do KM processes affect outcomes on individual and organizational level? (Helm et al., 2007)
- What relations exist between input, process and outcome variables?
- What input and process factors have an effect on the acceptance, utilization, individual effects and organizational effects?
- What are the direct dependencies among input, process and outcome variables and what success factors can be identified?

5 FINAL CONCLUSIONS

As demonstrated, the implementation of knowledge management measures in organizations is a complex undertaking. Especially the importance of the human factor should not be underestimated. A successful implementation can be achieved through well thought-out, employee-oriented implementation processes. By using a process model, it is possible to strategically support employee-oriented implementation processes that prevent reactance and increase employee's acceptance of the innovation (Winkler and Mandl, 2007). It is very important to integrate employees in different phases of the implementation.

In our case study, at the beginning a needs analysis was carried out, questioning all R&D members. On the basis of the results of the needs analysis it was decided to develop and to implement an expert finding system. A task force responsible for the project was formed, including employees from different positions and regions. To conceptualize the expert finding system, a content analysis was conducted by interviewing employees. Two workgroup with different employees were formed at the one hand for building a taxonomy for knowledge domains and on the other hand for the technical realization of the system. Moreover a usability test with employees concerning the technical realization was executed. Finally after revision sessions, the rollout of the expert finding system is ongoing.

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