

Summer 10-6-2011

# A QUESTION OF METHODOLOGY – CREATING A CUSTOMIZED ROLLOUT- METHOD FOR A COLLABORATION PORTAL IN A DISTRIBUTED ENVIRONMENT

Tobias Wiedemann

Philipp Brune

Heiko Gewalt

Follow this and additional works at: <http://aisel.aisnet.org/ecis2011>

---

## Recommended Citation

Wiedemann, Tobias; Brune, Philipp; and Gewalt, Heiko, "A QUESTION OF METHODOLOGY – CREATING A CUSTOMIZED ROLLOUT-METHOD FOR A COLLABORATION PORTAL IN A DISTRIBUTED ENVIRONMENT" (2011). *ECIS 2011 Proceedings*. 163.

<http://aisel.aisnet.org/ecis2011/163>

This material is brought to you by the European Conference on Information Systems (ECIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in ECIS 2011 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact [elibrary@aisnet.org](mailto:elibrary@aisnet.org).

# A QUESTION OF METHODOLOGY – CREATING A CUSTOMIZED ROLLOUT-METHOD FOR A COLLABORATION PORTAL IN A DISTRIBUTED ENVIRONMENT

Wiedemann, Tobias, Cassidian Electronics, EADS Deutschland GmbH, Wörthstr. 85,  
89077 Ulm, tobias.wiedemann@cassidian.com

Brune, Philipp, Neu-Ulm University, Wileystr. 1, 89231 Neu-Ulm, Germany,  
philipp.brune@hs-neu-ulm.de

Gewald, Heiko, Neu-Ulm University, Wileystr. 1, 89231 Neu-Ulm, Germany,  
heiko.gewald@hs-neu-ulm.de

## Abstract

*Cassidian Electronics, a globally operating business unit of EADS, aimed to implement a collaborative portal for its quality management department. After conducting a successful pilot phase producing a prototype for a small number of users it soon became apparent that a large scale roll-out would not be feasible without proper methodological support.*

*As no methodology was available to be used directly, an evaluation process was started and two champion methodologies (PADEM of Fraunhofer Institut and G&K - Großman and Koschek) were identified. A framework was developed to transparently compare the merits of each methodology and G&K selected as the most suitable. This paper presents the selection process as well as the case study describing the adaption mechanism and subsequent application of G&K for the roll-out of a large scale distributed collaboration portal in a high quality environment.*

*A key lesson learned is the strong benefit of an agile method for portal implementations and roll-outs to ensure high user satisfaction and technology acceptance leading to measurable financial benefits.*

*Keywords: Methodology Evaluation and Selection, Agile Implementation Methodology, Portal Implementation, Case Study.*

# 1. Introduction

In recent years, enterprise portals have become an increasingly popular new type of business information systems (BIS), aiming to provide user-centred integration of information, documents and other information systems. Enterprise portals improve the efficiency and effectiveness of business processes and provide new functionality for information technology (IT) supported collaboration and communication between employees, business partners and customers (Daniel and Ward, 2005). Despite their popularity for practitioners the body of academic research on the actual implementation and specifically the roll-out within an enterprise-wide context is scarce.

Enterprise portals differ from other BIS due to their highly integrative nature across the whole enterprise. Therefore, it cannot be assumed that the well-known process models and implementation methods used for other kinds of BIS (see e.g. DeGrace and Stahl, 1990) are sufficient for enterprise portals.

In this paper we present a case study on the implementation of an enterprise-wide collaboration portal used to improve quality management processes in the aerospace and defence industry. The case study illustrates a generic process for selecting and adapting the appropriate implementation methodology. Furthermore a framework for identifying and handling the applicable project challenges and critical success factors are presented. The results are generic for the chosen context and as such applicable to enterprise portal projects in comparable research domains as well.

This research presents a premier case for the information systems (IS) community as it targets not only the rollout process but the actual selection of the applicable method as well as necessary adaptations to anticipate user reactions. Main challenge of the presented project was to overcome user resistance to the new way of working. Additionally, decision makers within the enterprise needed to be convinced and the overall effect of the implemented solution on the organization and its processes in general needed to be managed. Therefore, the focus of the work was on the selection and adaptation of an appropriate methodology which would address these challenges and in addition allows dealing with the given portal IT-infrastructure already implemented in an ad-hoc way during a previous pilot project, as well as with the company's divisional structure.

The purpose of this paper is twofold: First, by comparing and evaluating the two portal implementation methods PADEM and Großmann and Koschek (G&K) we present a framework for selecting the proper method for an actual project. Second, we discuss a case study about the implementation of a collaboration portal to support quality management in the high-quality environment of the aerospace and defence industry.

The case study illustrates how the selected methodology needs to be customized to a specific project setting. Furthermore it identifies critical success factors for portal projects, these are considered to be human as well as technical factors: develop an individually customized rollout method, ensure frequent communication to inform all stakeholders, communicate first successes to let people feel the improvement, enforce up-to-date documentation, know-how transfer between administrators and developers, to continuously demonstrate the financial outcome of the project to convince decision makers.

The structure of the paper is as follows: First, we illustrate the project context in which the portal implementation took place. Following is a literature review about the current state of knowledge on the implementation methods of enterprise portals, and a detailed description of the process for selecting the appropriate methodology for implementation and rollout and the customization of the selected methodology. In section 6 the actual case study is described followed by the

backtesting results for the selected methodology are. We conclude with a summary of our findings, identify known limitations and formulate open issues requiring further research.

## 2. Project Context

EADS is a globally leading aerospace and defence company delivering integrated solutions tailored to the needs of its international customers. It generates EUR 4.82 bn revenue and employs 120.000 employees (figures as per 2009) in an organizational structure of international business units.

Cassidian, one of EADS's business units is a leader in global security solutions and systems, providing lead system integration and value-added products and services to civil and military customers. Cassidian incorporates three divisions: Cassidian Electronics (CE), Cassidian Systems and Cassidian Air Systems and has 28.000 employees on all five continents. CE –the object of the case study presented- develops and manufactures mission critical electronics for defence and civilian use in a high quality surrounding.

CE's quality management department is responsible for covering all customer-, market- and standard (norm) requirements as well as continuous improvement processes within the business unit. The vision is to create and maintain an integrated business management system which fulfils all requirements of EADS group.

As the quality management team is located at different locations, the challenge is to coordinate their tasks across the country in order to fulfil their mission of creating guidelines for managing the CE staff as well as gaining the trust of internal and external clients. The collaboration portal is meant to support all related tasks by improving IT supported communication, reduce crowded mailboxes, enhance the collaboration on documents and facilitate the organization of resources across the different locations.

To reach the stated targets a pilot project (dry run) was conducted to prototype a solution for the collaboration portal for a comparatively small number of users (ten) within one department. The pilot project was delivered successfully. However, it became evident that for a large implementation and roll out a formal delivery method would be necessary. Additionally, it was decided that the prototype developed needs to serve as technical basis for the final portal development.

## 3. Current State of Knowledge

A considerable amount of research has been published in the general field of enterprise portals. Most authors agree upon a definition of an enterprise portal as personalised, web-based front-ends for accessing information, documents, data and business applications in an integrated, process oriented way (e.g. Raol et al, 2002, Daniel and Ward, 2005). Thus, enterprise portals may provide functions like single sign-on (SSO), role and function based services, personalisation, HR self-service, collaboration tools and Web 2.0-style social software features, content and document management and integration of enterprise applications (Daniel and Ward, 2005). Enterprise portals are usually classified by their main application domain, thus leading to the distinction between i.e. employee portals, customer portals, or business-to-business (B2B) portals. Employee portals and their relation to and use as a means of corporate knowledge management in special also have been intensively studied by various authors (e.g. Ezingard et al, 2000, Firestone, 2003, Cloete, 2003, Benbya et al, 2004, Le-Nguyen et al, 2008).

However, although the functionalities and applications of enterprise portals have intensively been discussed in literature, comparatively few papers have been published on methodologies for

implementing enterprise portals and the challenges related to it (Scheepers, 2006, Remus, 2007). The approaches PADEM (Portal Analyse und Design Methode) of the German "Fraunhofer-Institut für Arbeitswirtschaft und Organisation" (IAO) (Gurzki and Özcan, 2003), and Großmann and Koschek (Großmann and Koschek, 2005) have been suggested from practitioners' side. These methodologies have not yet been compared and analysed to assess their specific advantages.

Furthermore, only a limited number of case studies about real portal implementation projects exist in the literature (Ezingeard et al, 2000, Ruta, 2005, Le-Nguyen et al, 2008), providing best-practice examples and benchmarks for practitioners.

Due to the highly integrative nature of a portal, the main challenge usually are not the functional or non-functional requirements posed on the system itself, but organisational aspects of the company environment in which the portal implementation takes place. Remus (2006, 2007) lists critical success factors for portal implementation projects as being proper business process management in advance, change management, flexible project structure, organizational culture, and project strategy.

#### 4. Methodology Selection

Process models help to manage the complexity of IT implementation projects. When initiating an IT project, choosing the appropriate implementation method plays an essential role, as it has a significant influence on the success and overall cost of the project (Fils et al, 2005). Therefore, the implementation methods available and applicable to the project context have to be analysed and evaluated. To perform this evaluation a process based on the selection framework suggested by Fils et al, 2005 was used (see figure 1).

The selection framework consists of two phases, the status survey and the actual evaluation. First, the target definition is performed to specify the project objectives and resulting requirements as well as the estimate of expected benefits ("status survey"). Following this step the implementation methods are pre-selected according to the main defining dimension of their desired generalization and abstraction level. After that, a general assessment of the pre-selected implementation methods is carried out with respect to further defining dimensions such as the project phase coverage and branch specificity. Next a feature assessment is performed regarding specific method features like automation possibilities or tool support. Finally, the remaining methods are compared by means of a cost-benefit analysis in order to identify the most adequate solution.

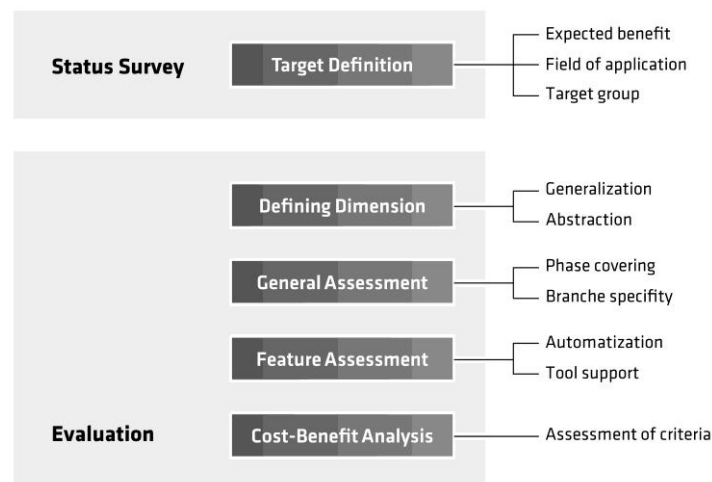


Figure 1: Framework for evaluating implementation methods (based on Fils et al, 2005)

As candidates for the selection process in the described project context two suitable portal implementation and rollout methods were identified: Fraunhofer PADEM (Gurzki and Özcan, 2003) and the method described by Großmann and Koschek (Großmann and Koschek, 2005).

#### 4.1. PADEM ("Portal Analyse und Design Methode")

The "Portal Analyse und Design Methode" (PADEM) is a method developed by Fraunhofer IAO to support companies when implementing an enterprise portal. It includes activities necessary to complete the phases "Strategy", "Analysis", "Conception", "Realisation" and "Introduction". PADEM is a sequential method which is characterized by a modular structure (see Figure 2) and represents a standard procedure which is adapted for the different types of portals addressing specific target groups (customers, employees, suppliers, etc.) (Gurzki and Özcan, 2003).

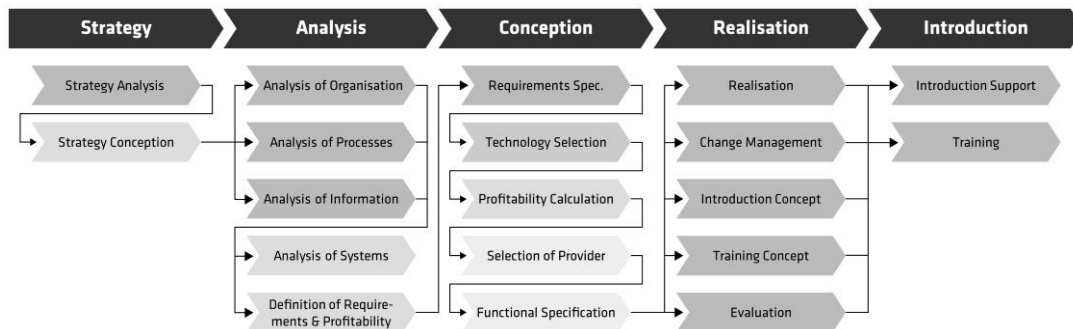


Figure 2: Modular Structure of PADEM (based on Hinderer et al, 2005)

#### 4.1. G&K (Großmann and Koschek)

The method of Martina Großmann and Holger Koschek (G&K) is also based on a modular structure. However, it is an iterative process model, consisting of seven phases including "definition of objectives", "analysis of requirements", "analysis of IT, processes and systems", "portal conception", "implementation", "test" and "introduction", ensuring the continuous evolution of the portal implementation (see Figure 3). After completion of the introduction phase a new iteration starts, whereby each iteration generates adapted outputs (vision, requirements catalogue, concept paper and portal concept). The methodology requires an adaption of objectives in each iteration and accompanying project management is considered very important during the whole project (Großmann and Koschek, 2005).

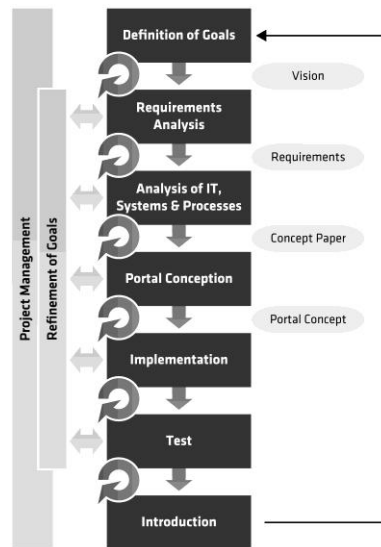


Figure 3: Implementation method suggested by Großmann&Koschek (based on G&K 2005)

In the present project context, the main defining dimension was the decision whether to use a standard framework or create an individual method based on a rollout framework, requiring the development of methodical know-how within the enterprise. A further defining dimension evaluated in the general assessment was the coverage of the phases design, implementation and strategy. In the feature assessment, selection criteria were specific features like automation options and user support.

The comparisons lead to the decision to use a customized, project-specific adaptation of the G&K method. This method was regarded as better suited for the following reasons:

- It represents a customizable generic guideline whereas the PADEM method has a fixed architecture. Since the dry run had started already in one unit of the Quality Management department, an adaptable method was needed to reflect the structure of an already running project.
- G&K is an iterative process model with many similarities to agile methods widely used in the field of software development today. Its iterative nature allows fast and direct implementation of changes during the specific phases which reduces overall project cost.
- G&K point out the need for continuous project management during the introduction of a portal which allows the company to build up valuable know-how in this field (Becker, 2008). The PADEM method on the contrary may only be used in cooperation with Fraunhofer Institute and thus would cause high consulting costs during the whole project.
- The focus of PADEM is portal development. However, as the basic implementation of the tool was already completed at project start (compare dry run), G&K is the better alternative considering the requirements of the present project.

## 5. Customization of Methodology

During the adaptation of G&K the progress within the department was assessed individually. The first iteration was considered as completed with the dry run, having successfully introduced the solution in a team of 10 test persons. The result was proper acceptance within the team due to first improvements in electronic communication and processing of documents. On this basis the second iteration was initiated in order to increase the scope of improvements in a larger target group of up to 100 persons.

The definition of objectives, based on the first iteration, was regarded as completed. The basic objectives remained the same and were now expanded to a more global context. Improvement of document processing, IT communication and resource organization remained the core focus.

Functional and non-functional requirements were gathered, analysed and evaluated regarding their integration potential during the whole project which guaranteed the continual improvement of the portal. Requirements which could not be integrated yet were documented in a requirements catalogue to ensure that they could be implemented after a hard- or software update. This proceeding was based on change management methodologies according to ITIL (Victor and Günther, 2005).

Relevant business processes and contents were examined, observed and evaluated since the different requirements of the teams had to be considered when designing the portal. The integration of new processes on the other hand could cause new system- and IT requirements. During the portal conception phase, a detailed concept was developed based on the more general business requirements specification created in the first iteration.

The implementation phase included quality assurance, the planning of the roll-out process and the development of a detailed training concept for key users and standard users. For the test scenario a process with numerous media breaks as well as a team of test users was selected in order to evaluate the solution.

The planning of the final portal introduction intended to guarantee a smooth transition when preparing the affected employees for the upcoming change. Finally the economic effectiveness of the project had to be measured by means of a profitability analysis. The completion of the second iteration at the same time represented the beginning of a third one, which will not be discussed in this paper.

Since companies face constant changes due to e.g. globalization and therefore intensified international competition, processes and organizations have to be adapted permanently (see figure 4). In order to countervail against transformations in the economic environment, companies are making use of change management methodologies (Stolzenberg and Heberle, 2009; Doppler and Lauterburg, 2005). The challenge for enterprises is "a faster and more economic management of a growing diversity of changing tasks" (Doppler and Lauterburg, 2005, S. 55).

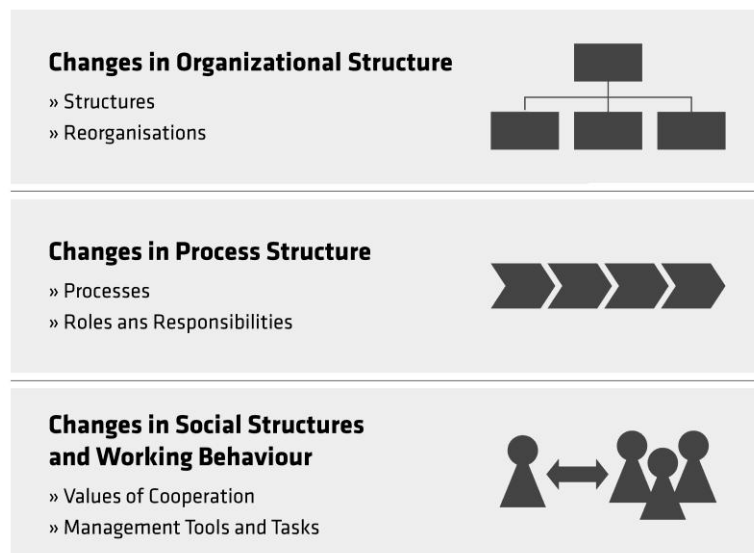


Figure 4: Levels of Change (based on Stolzenberg and Heberle, 2009)

Communication plays an important role in change management as employees affected by change have to be prepared to the changing environment. In order to ensure the acceptance of the new processes and working methods the employees have to identify additional value in the new solution.

As soon as the team is informed about the type of change they will face, the next step is to qualify them sufficiently as well as provide further supportive actions. Making use of different training methods (e-learning, classroom and blended learning), an individual training concept, tailored to the needs of the department or enterprise has to be developed (Ploski, 2008). Depending on the role the employee plays within the organization (standard user, key user, etc.) she/he has to gain a certain level of competence to fulfil the required tasks (Ford, 2008).

The main criteria when measuring success of software introduction are user acceptance and economic profitability. When measuring user acceptance a survey within the team can gather general attitude of employees towards the new tool. The survey can either be conducted in form of a questionnaire or in personal conversations with the users. At the same time this method offers a good opportunity to gather new ideas or requirements. The user acceptance can also be



measured by site usage reports. The administrator of a collaboration room can track the frequency of use within the team which shows the real picture of acceptance.

The other criterion is economics. In order to measure the financial improvement, process KPI's have to be defined. In this case the "time of process execution" could be taken into closer consideration, since it has direct impact on costs.

## 6. Case Study: Roll-out of the Collaboration Portal in the Quality Management Department of Cassidian Electronics

### 6.1. The Collaboration Portal

The portal solution is technically based on Microsoft SharePoint Server 2007-technology. Its contents are logically structured according to the different responsibilities of the departments, each administrated by a responsible team member. Virtual "team-rooms" in which the actual collaboration takes place are located in the next logical layer. Furthermore, every employee has a personal "MySite" at his/her disposal.

The landing page describes important conventions to ensure the successful collaboration with SharePoint and prevent chaotic structures. In addition, a virtual helpdesk allows user self-support to minimize training expenditures as well as increase the acceptance by decision makers as well as end users.

### 6.2. The Implementation Process

G&K is an iterative methodology (see figure 3), thus the second iteration had to take the results of the first iteration (initial dry run) into account. In fact, for the second iteration the results of the first four phases of G&K (see table 1) were to some extent already pre-defined by the dry run.

Phase	Status in Department
Definition of Objectives	Based on Pilot
Analysis of Requirements	Continuously
IT-/ Process-/ System Analysis	Continuously
Portal Conception	Based on Pilot
Implementation	Developed
Test	Developed
Introduction	Planned

Table 1: Second iteration based on the G&K methodology

Based on the insights gathered in the dry run the analysis of requirements and the IT-/process-/system-analysis phases were continued in the second iteration to account for changes of requirements compared to the first iteration. In this early stage, the iterative nature of G&K was key for handling different status of completion within the first four phases as defined by the results of the pilot project. Using a sequential method would have created serious problems.

Since the first four phases were partially defined within the dry run, the main focus of the second iteration was on the implementation and test phases. The final introduction (roll-out) phase will

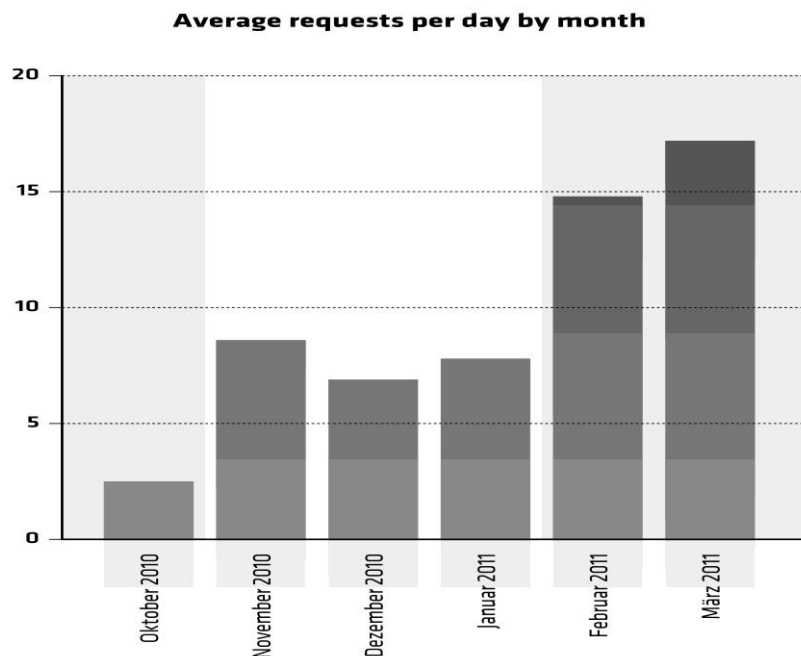
follow after a successful backtesting phase. Within these phases, G&K allowed to continuously react to user feedback and to incorporate new or changed requirements.

For implementation of the solution -supported by an external service provider- a time frame of six months was planned. The project plan was based on the critical milestones given by the G&K methodology. The implementation was split into the tasks 'quality assurance', 'introduction concept' and 'training concept', as recommended by G&K.

**Quality assurance** aims at following a stringent quality strategy during the rollout of the portal e.g. by introducing unified standards. To facilitate the use of standards only functionalities already provided by the tool were to be used. Experiences showed that the integration of individually developed add-ons can cause problems due to incompatibility after SW-updates. Furthermore a common design template was designed in every area.

The second step is the selection and planning of the appropriate **introduction strategy**. It was decided to apply a mixed methodology which means a combination of a bottom-up and a top-down approach. This should ensure that on the one hand all user requirements could be fulfilled in the final product and on the other hand having the whole back up of responsible decision makers. Additionally, it was decided to carry out the final rollout step by step and not as “big bang” in order to introduce the new tool and working methods smoothly to the employees.

The development of a customised **training concept** is crucial for the implementation as it includes the direct contact to the users and thus can be used to convince the team of provided benefits. The application of the tool should be trained hands-on in combination with a presentation that leads users through a set of tasks with an increasing degree of complexity. The success of the training has to be evaluated by the participants in an open discussion with the coach as well as in an anonymous questionnaire which is given out at the end. This can help to gather further requirements and thus improve the training as well as the portal itself.



*Figure 5: Site usage report of the collaboration portal*

To prove the effectiveness of the described implementation concept, in Fig. 5 the site usage report of the collaboration portal during the implementation period is shown. The data demonstrates that the number of people using the tool has increased approximately by a factor of 10 since the start

of the implementation. A significant “jump” in the user requests can be observed in November 2010 and February 2011, related to the start of the end user training and the availability of additional new and important features (online booking of internal resources, holiday planning for employees). This emphasizes the high importance of user trainings and the availability of features recognised as a benefit by the users for the success and acceptance of a portal solution.

## 7. Backtesting

For the back testing, a process characterized by several media breaks was selected in order to check functionality, usability and stability of the tool. The process, dealing with the approval of documents, is planned to be integrated into the portal when tested successfully.

A group of eight employees already having the required SharePoint knowledge due to the training described earlier were selected to evaluate handling of the new procedure. Every user was given a working document describing the tasks of a certain role within the process. Furthermore, each test person was provided with specific permissions representing their role in the process. Thus each participant was confronted with a different, role-specific view on the web-based user interface.

In a next step, the process was initiated by the responsible person and the participants were asked to perform their individual tasks. Having completed the process, the finished output document was available in a document library within a SharePoint site and could now be used for further processing.

Upon completion the procedure was evaluated by the test users. An open discussion moderated by a coach gathered the user's feedback. Additionally, a feedback questionnaire was used to obtain a detailed picture of the test users' attitude towards the solution.

The resulting evaluation and interpretation of the feedback showed a very positive attitude towards the new procedure in SharePoint. Six of eight persons described the solution as clearly performance enhancing for their daily work. Two persons had general problems with the navigation in SharePoint but were not averse to working with the new tool due to perceived additional value. According to the statements of the test users, process lead times as well as paper and printing cost would be reduced significantly.

In fact, considering the traditional paper-based approval process with only three persons involved, which included three media breaks (three times print, sign and scan a document). Making use of the new SharePoint-based process using digital signatures and joint work on the document within one platform and only one final printout, printing and paper costs for this process were reduced by ~60%. Furthermore, process lead time could be lowered by ~30%, as the activities of printing and scanning were reduced strongly (max. one final printout).

Practical experiences during the project showed the importance of permanent communication and support when introducing new modes of operation based on recent IT-technologies. Especially senior employees, often showing low IT-affinity, have to be informed, trained and supported more individually since each additional tool is associated with additional effort. Key users can enhance the acceptance within this target group by promoting the solution in the respective departments and consult users intensely when working with the tool. As even the best technical implementation cannot be realized without the acceptance of executing employees, human factors play an essential role during a complex IT rollout project.

## 8. Conclusion, Limitations and Further Research

This case study presents the successful methodology based implementation of an department-wide collaboration portal solution. It shows how such a portal can successfully be implemented within a high-quality environment by making use of an individually customized implementation and roll-out methodology. The main critical success factors for such projects are a good integration of all relevant stakeholders by means of a continuous change management, i.e. by measures as communicating first successes to let people feel the improvement or demonstrating the financial outcome of the project to convince decision makers. In general, the human factor should not be underestimated in such projects.

The main limitation of the present study is its restriction to a single case in a single company. However, we assume that our findings will also apply in similar cases. Nevertheless, this remains to be proved in additional field studies.

As the methodology of Grossmann and Koschek used in this project is already an iterative process model, it remains an open issue if and how agile methods from the field of software development like Scrum (DeGrace and Stahl, 1990) etc. may be adapted and used for enterprise portal implementation and roll-out-projects. To clarify this issue further research is needed.

## 9. References

- Becker, R. 2008. Employee Self-service in kleinen und mittleren Unternehmen. 1. Auflage. Norderstedt : Books on demand GmbH, 2008.
- Benbya, H; Passiante, G and Belbaly, N.A. 2004. Corporate Portal: A Tool for Knowledge Management Synchronization”, International Journal of Information Management, Vol 24, p.201-220.
- Cloete, M, Snyman, R. 2003. The enterprise portal – is it knowledge management? Aslib Proceedings, Vol. 55, Issue 4, 234-242
- Daniel, E. and Ward, J. 2005. Enterprise portals: Addressing the organisational and individual perspectives of information systems. Proceedings of 13th European Conference on Information Systems, 1-16.
- DeGrace, P. and Stahl, L. 1990. Wicked Problems, Righteous Solutions: A Catalogue of Modern Software Engineering Paradigms, Prentice Hall, 1990.
- Doppler, K. und Lauterburg, C. 2005. Change Management - Den Unternehmenswandel gestalten. 11. Auflage. Frankfurt/Main : Campus Verlag GmbH, 2005.
- Ezingear, J-N, Leigh, S. and Chandler-Wilde, R. 2000. Knowledge management at Ernst & Young UK: getting value through knowledge flows. Proceedings of the 21st International Conference on Information Systems, p.807-822.
- Filß, C.Höhn, R., Höppner, S., Schumacher, M. Wetzel, H. 2005. Rahmen zur Auswahl von Vorgehensmodellen. Arbeitsbericht der GI Fachgruppe WI-VM – Arbeitskreis „Vorgehensmodelltypen“, 2005.
- Firestone, J.M. 2003. Enterprise Information Portals and Knowledge Management, Butterworth-Heinemann, Burlington, MA, 2003.
- Ford, N. 2008. Web-Based Learning through Educational Informatics. Hershey/London : Information Science Publishing, 2008.
- Großmann, M. und Koschek, H. 2005. Unternehmensportale - Grundlagen, Architekturen, Technologien. 1.Auflage. Berlin, Heidelberg : Springer, 2005.
- Gurzki, T. und Özcan, N. 2003. Unternehmensportale - Kunden-, Lieferanten, Mitarbeiterportale in der Praxis. Stuttgart : Fraunhofer IRB Verlag, 2003.
- Hinderer, H. et al. 2005. Die Fraunhofer Portal Analyse und Design Methode (PADEM).

- Stuttgart, Baden-Württemberg, Deutschland, 2005.
- Le-Nguyen K, Harindranath G, Dyerson R 2008. A Knowledge Management Perspective an a Corporate Portal Implementation: A Case Study of a Global IT-Management Consultancy Firm. In 16th European Conference on Information Systems (Golden W, Acton T, Conboy K, van der Heijden H, Tuunainen VK eds.), p.1129-1140, Galway, Ireland.
- Ploski, V. 2008. Die Integration des Users bei IT-Rollouts. business-wissen.de. [Online] 15. Mai 2008. <http://www.business-wissen.de/unternehmensfuehrung/einfuehrung-die-integration-des-users-bei-it-rollouts/>.
- Raol, J.M; Koong, K.S; Liu, L.C and Yu, C.S (2002), An Identification and Classification of Enterprise Portal Functions and Features, Industrial Management + Data Systems, Vol. 102, No. 7, p.390-399.
- Remus, U. 2006. Critical Success Factors of Implementing Enterprise Portals. Proceedings of the 39th Annual Hawaii International Conference on System Sciences, p.182-191.
- Remus, U. 2007. Critical success factors for implementing enterprise portals - A comparison with ERP implementations: Business Process Management Journal Vol. 13, No. 4, 2007 p.538-552.
- Ruta, C.D. 2005. The application of change management theory to HR portal implementation in subsidiaries of multinational corporations: Human Resource Management, Vol. 44, Issue 1, p.35-53.
- Scheepers, R. 2006. A conceptual framework for the implementation of enterprise information portals in large organizations. European Journal of Information Systems, 15(6), 635-647.
- Stolzenberg, K. und Heberle, K. 2009. Change Management - Veränderungsprozesse erfolgreich gestalten - Mitarbeiter mobilisieren. 2. Auflage. Heidelberg : Springer, 2009.
- Victor, F. und Günther, H. 2005. Optimiertes IT-Management mit ITIL: So steigern Sie die Leistung Ihrer IT. S.59. Wiesbaden : Vieweg Verlag, 24.11 2010.