Measuring the Value of User Participation in Change Projects – Results from Case Studies in the Mobile IT-Service Sector

Bettina Thurnher
Hochschule Liechtenstein
bettina.thurnher@hochschule.li

Jan vom Brocke
Hochschule Liechtenstein
jan.vom.brocke@hochschule.li

ABSTRACT

Mobile devices offer great potentials for business process change and reengineering. However, realizing these potentials in practice still faces serious problems. While technologies are now widely mature, the problems still lie in the adoption and usage of mobile technology. In this paper, we analyze the contribution of user participation to the successful improvement of business metrics. This paper presents results from five case studies conducted in the IT-Service sector. The paper gives an example of a process calculation before and after mobile tool integration. Major findings include (a) user participation leads to improvements in business metrics and, (b) faster adoption and payback periods.

Keywords

Business Process Management, Value of User Participation, Organizational Change and Mobile Technology, Key Performance Indicators

INTRODUCTION

Mobile devices in information and communication technology have raised great expectations during the past years (Wang et al., 2005; Gumpp & Pousttchi, 2005). Following the discussion in academia and industry, expectations go far beyond cost cutting. In particular new business models (and hence new ways of market reach) are inspired by mobile devices. This is grounded by a number of recent studies (cf. Kornak et al. 2004; Basole 2005; Pousttchi & Thurnher, 2006; 2007). In more detail, the potentials of mobile devices for business process management include (a) the release of workforce from desktop IT-Systems, (b) replacement of paper-based processes, and (c) access to corporate resources and automated online information requests (cf. Basole, 2005; Basole & Rouse, 2007).

In practice, however, the successful implementation of mobile business processes is still a serious problem. Previous research has argued that successful adoption and implementation of any emerging devices, such as mobile devices, often requires fundamental changes of a company's organisation (cf. Taylor & McAdam, 2004; Rouse, 2006). In fact, although mobile technology is widely available nowadays, most projects fail in establishing sustainable business processes that are efficiently applied in the business processes of a company. Take for example the experience from a BPM projects in the health care sector, where processes for using a PDA (personal digital assistant) in medical inspections have been analysed (vom Brocke et al., 2007). A huge variety of different performance styles in the same process can be identified each having a significant impact on the usefulness of mobile devices. In particular, also those cases have to be considered when mobile devices may just as well be a hindrance to business depending on the specific personal context of use.

In our research, we focus on the role of user participation when implementing mobile business processes. According to research in software- and usability engineering (e.g., Gibson 1977; Nielsen 1993; Barki & Hartwick, 1989, Nielsen, 2003; Thurnher 2007, etc.) user participation is expected to have a positive effect on the efficient use of mobile devices in practice. However, little empirical research is available looking at the effects of user participation in introducing mobile devices. In particular, also the costs of user participation have to be taken into account and weighed against potential benefits. From a normative perspective (cf. Hartman et al., 2000; Ward & Peppard, 2002), different levels of user participation have to be distinguished and analysed regarding their value contribution in a specific organisational context. According to this context, also different indicators relevant in measuring the performance of the change process have to be taken into account.

With this paper, we present the results of five case studies in the IT service sector. In these studies, we analyzed the impact of user participation in different projects on introducing mobile devices from 2005 to 2007. We anticipate that user participation within the development process of a mobile tool leads to faster adoption and acceptance of mobile devices. We investigate different degrees of user participation and report on their value contribution by means of key performance indicators. The results are presented as follows: In chapter 2 related work in the field of mobile devices is reflected, particularly distinguishing different degrees and extents of user participation. On that basis the research design applied in our work is introduced in chapter 3. The major findings of our work are presented in chapter 4 and further discussed in chapter 5. We conclude with a summary and an outlook to future research given in chapter 6.

RELATED WORK

The Standish Group investigated a set of industry projects (365 industrial responses involving more then 8300 applications) and the main reasons for project failure. The most important reasons for project interruption were: (1) lack of management support and (2) a lack of user involvement (Standish Group, 2001). Obviously, strong *user participation* during mobile tool development is necessary to fulfil individual requirements of the target user group and to address the need of the mobile devices within business processes.

The investigation of positive impacts of *user involvement* and *user participation* on system acceptance has been done extensively within the ICT literature over the last 30 years of ICT research, e.g., (Kaasinen, 2005; Nielsen, 2003; Pedersen, 2002; Ives & Olson, 1986; Lucas 1974). The terms *user participation* and *user involvement* are often used inter-changeably in the Information System literature. However, in other disciplines, the concepts are accorded separately and have precise meanings (Barki & Hartwick, 1989). In order to address this anomaly, Barki and Hartwick argue that the term user participation be utilized in reference to development-related activities and behaviours of users and their representatives during the development process, and that user involvement be used to refer to the subjective psychological state that reflects the level of importance and personal relevance of the information system to users. These researchers also argue that user participation is one of the more important concepts, of user involvement.

User participation contributes to improve system quality by: (a) providing a more accurate and complete assessment of user information requirements (Norton & McFarland, 1975, Robey & Farrow 1982), (b) providing expertise about the organization and the system (Lucas, 1974). (c) avoiding development of unacceptable or unimportant features (Robey & Farrow 1982) and (d) improving user understanding of the system (Lucas, 1974; Robey & Farrow 1982).

User participation leads to increased system acceptance by: (a) developing realistic expectations about system capabilities (Gibson, 1977), (b) providing an arena for bargaining and conflict resolution about design issues (Keen, 1981), (c) leading to system ownership by users (Robey & Farrow 1982) (d) decreasing user resistance to change (Lucas, 1974) and (e) committing users to the system (Lucas, 1974).

Whereas the *importance of user participation* has been pointed out in the literature in the last decades (e.g., Lucas, 1974; Barki & Hartwick, 1989, Nielsen, 1999; Nielsen, 2003; Pousttchi & Thurnher 2007) the integration of users within the software development processes is still not considered in its entirety throughout industry and especially within the IT-Service sector. The development of tools is possible without user participation in the design process – but deployment will be more cumbersome due to adoption and acceptance barriers amongst end users (Henneman, 1999). Moreover, the importance and benefits of user participation and participatory design have been widely investigated(e.g., Schuler & Namioka 1993; Muller 2003).

Whereas linking usability considerations and user participation to the impact on business metrics have been investigated, e.g., by Nielsen, 2003; in depth investigations targeted at mobile applications in the IT-Service sector are missing so far. Nielsen (2003) stated in his report that he estimates "… spending about 10% of a project's budget on usability activities doubles usability".

In the findings section we present a process calculation *before* and *after mobile tool integration* for IT-Service execution. The calculation is based on (Hirschmeier 2005; Roth 2004)

The next section describes the research design, the case study companies and the KPIs which have been investigated.

RESEARCH DESIGN

To investigate the impact of varying extends of user participation on KPIs within mobile business processes, we applied case study research as it is appropriate for examining practice-based problems, since it allows a researcher to capture the knowledge of practitioners and investigate *business impact* of methods or systems (Anda, 2003; Benbasat et al., 1987; Creswell, 2002; Eisenhardt, 1989). Where there is no ideal number of cases which should be investigated in case study research, Eisenhardt suggests conducting four to ten case studies: "With fewer than four case studies it is often difficult to generate theory with much complexity and its empirical grounding is likely to be unconvincing, unless the case has several mini-cases". (1989 p. 545) With more than ten cases it becomes difficult to cope with the complexity and saturation degree is already achieved (cf. Eisenhardt, 1989). Within this paper 5 case studies have been undertaken in order to meet the suggestions of Eisenhardt (1989) from a research perspective.

The studies were carried out in the IT-Service sector. A basic IT-Service process starts with a service request from the customer. Those requests are classified according to predefined *Service Level Agreements (SLAs)* with the customer. Dispatching of the service requests is then arranged by the dispatching/head-office department of the IT-Service company. As a next step service technicians execute service tasks (e.g., repair, installation and maintenance of office machines). IT-Service technicians are, e.g., engineers who work on the customers' side. Technicians are called either periodically (e.g., continuous support for a set of devices) or on-demand if unexpected events occur (e.g., machine break-down). A major challenge is to schedule IT-Service technicians to individual tasks properly (supported by the head-office/dispatcher) to fulfil service tasks. After service task execution the technicians have to capture and transmit job related data (e.g., working- and driving time, number of used spare parts). In the paper-based process this has been done on a paper-form which was transmitted to a desktop-system (normally at the end of a working week by the technician or head-office staff). When job data was available head-office/finance department could start with the billing process (prepare and send bill to the customer). Through the application of mobile devices an improvement of KPIs within the mobile business process is expected.

In order to find evidence for measuring the value contribution of user participation, we refer to the concept of *business impact* (ITIL, 2005). In the ITIL literature, impact is a measure of business criticality, often equal to the extent to which an event (e.g., periodical service request or unexpected machine breakedown) leads to distortion of agreed Service Level Agreements (SLAs). We took the ITIL standard as a starting point and discussed relevant performance indicators together with the CEOs and CTOs of the case study companies. The following key performance indicators (KPI) have been agreed upon.

KPI	Definition
Time to Bill	Duration [in days] from task completion to invoice submission.
SLA-Rate	Service Success Rate [in %] is defined as the ratio of the duration from service request to fulfilment of the request related to the agreed (in the customer contract) SLA.
Work-Load in the head-office	Work load [in %] in the head-office derived from the number of incoming calls (by technicians) and e.g. sales personnel.
Paper-handling time	Paper handling time [in days] is the duration from task completion until the submission of performance data (working-, driving-time and number of used spare-parts) to head-office.
Payback Period	The return on investment [PP in years] is defined as the amortization time of mobile tool integration (development and deployment costs) vs. reduced cost through mobile tool usage.
Tool Acceptance	Attitudes towards usage and intentions to use the technology. This includes adoption and transition barriers from the paper-based to the mobile tool supported process. Tools acceptance is based on interviews and mapped to a nominal scale [1 .. low, 2 .. high end user acceptance]
Process Calculation	Example of a process calculation *before* and *after mobile tool deployment*.

Table 1. KPI Definition and Measurement Approach

A change of KPI was measured through pre- and post mobile tool integration analysis of the above described performance measures. Moreover, through the interviews data was validated and refined. KPIs where captured in the same granularity in all case study companies, this was assured through a measurement template provided by the researcher.

Despite the numerous above mentioned value propositions and the need for including the end user within software development of mobile devices - within industry projects user involvement is still not widely applied (e.g., Nielsen 1993; Barki & Hartwick 1989; Thurnher 2007) . In order to investigate and clarify the value contribution of user participation within the development process of mobile solutions we formulated the following research questions (RQ).

RQ: What impact has user participation - in the development phase of mobile tools - on business process key performance indicators after deployment?

Expecting an improvement on the identified KPIs, we focus on the degree of change (KPI improvement). For instance, we expect a correlation regarding the degree of user participation and positive impact on KPIs.

For data gathering CEO, CTO, project managers and end users of the mobile application have been questioned with semi-structured questionnaires in face-to-face or via telephone interviews. Interviews lasted 1 hour to 1.5 hours. The participants (interviewees) of the case studies have been selected based on their *role in the organization* and their *level of experience* with existing system and processes. Moreover, interviewees have been selected according to their functions within the mobile application project (El-Amrani et al., 2006).

Table 2 provides an overview of the case study companies and shows the varying degrees of user participation within the mobile tool development process. User participation in all phases means that during the entire development cycle (requirements analysis, design, prototyping, implementation, and maintenance) the users have been involved through interviews, questionnaires and trials. Little user involvement refers to the fact that users where only involved in the implementation phase; mainly the selection of mobile devices.

Company	Provided Service	# user	Architecture	Degree of User Participation
1)Telecommunication Service Provider	Technical customer service	Large (12,000)	Client/Server	Little involvement; mainly in device selection and testing
2)Municipal Utility Company	Technical customer service	Medium (1,000)	Client/Server	User participation in all phases
3)IT-Service Provider	Technical customer service	Small (40)	ASP solution, browser-enabled	User participation in all phases
4)Toll Collection and Railway Maintenance	Technical customer service and trainings	Mini (7)	ASP solution, browser-enabled	Little user involvement; mainly in the device selection phase
5)Machine Construction Company	Technical customer service	Large (3,500)	Client/Server	User participation in all phases

Table 2. Case Studies Description

All five case studies have been longitudinal studies in the IT-Service sector within different industries and lasted from 6 to 15 months. Interviews have been transcripted and fed back to the interviewees in order to reduce possible errors and clarify misunderstandings. For data gathering CEO, CTO, project managers and end users of the mobile application have been questioned with semi-structured questionnaires (30 questions) in face-to-face or via phone interviews. Table 3 gives an overview of the case study interviewees:

Interviewees	Method	Interviewee's Background
Interviewee 1 (Telco)	Face-to-face	Technical
Interviewee 2 (Telco)	Face-to-Face	Business
Interviewee 3 (Telco)	Face-to-Face	Business
Interviewee 4 (Telco)	Face-to-Face	Technical
Interviewee 5 (Utility)	Face-to-Face	Business
Interviewee 6 (Utility)	Telephone	Technical
Interviewee 7 (IT Service)	Face-to-face	Technical
Interviewee 8 (IT Service)	Face-to-Face	Technical
Interviewee 9 (IT Service)	Face-to-face/Telephone	Technical
Interviewee 10 (IT Service)	Face-to-Face	Business
Interviewee 11 (Toll Collect.)	Face-to-Face	Business
Interviewee 12 (Toll Collect.)	Face-to-Face	Technical
Interviewee 13 (M. Construct.)	Telephone	Technical
Interviewee 14 (M. Construct.)	Face-to Face/Telephone	Business

Table 3. Interviewees of the Case Studies

In the following section major findings of our work will be summarized.

FINDINGS

In this section we present the results related to the KPIs in the case study companies under investigation.*?*

We were able to observe that a higher degree of user participation led to a faster / increased improvement of KPIs and vice versa within companies with a lower degree of user participation (e.g., only device selection phase) a lower acceptance rate and a smaller improvement of KPIs (e.g., longer PP period) could be identified.

The business process improvement values are mainly given in percent as absolute numbers have referred to company sensitive data.

KPI	Improvement Capabilities (Management Goal)
Time to Bill	Paper-based processes required too much time. Management Goal: Reduction of "time to bill"
SLA-Rate	Limited access to knowledge bases and spare-part availability impede efficient task completion. Management Goal: Improvement of SLA Rate.
Work-Load in the head-office	Missing online-communication requires additional call-backs in the head-office. Management Goal: reduce work load in the head-office
Paper-handling time	Missing online completion of tasks requires rework effort, performed daily or once per week. Management Goal: reduce duration until submission of performance data.
Payback Period	The development and integration of mobile tools require additional costs; nevertheless, Management Goal: saving by replacing the paper-based process should lead to a short PP.
Tool Acceptance	A higher acceptance leads to faster improvements on KPI and lowers adoption and transition barriers from a paper-based to a mobile tool supported process.

Table 4. KPI Improvement Capabilities

In the following further information on the results will be given, referring to each of the key performance indicators listed above.

Time to Bill

As head-office staff have faster (directly after job completion or at the end of a working day) job data access the time to bill could be reduced considerably by **75 to 50%,** including single item billing and total accounts. In the case study companies (case 2, 3 and 5) with user participation in all phases of mobile tool development the time to bill increased by 75% (e.g. from 21 working days down to 5 working days). In cases 1 and 4 the time to bill improvement was 50%.

SLA-Rate

The SLA-rate increased by **30 to 40%.** This means that in 30 to 40% of all service cases the technician can execute the job within the agreed SLA-time period (e.g., within 24 hours after service request receipt). This is due to improved information e.g., the service order, problem description and spare-part availability, as well as customer reachability. Again in companies with a higher degree of user participation the improvement was 40% whereas in case 1 and 4 it only reached an improvement of 30% improvement.

Work-Load in the head-office

Call and work-load in the head-office have been reduced by **45 to 50%.** This was due to the fact that technicians where able to gather information (e.g., detailed customer address, prior occurred problems at a customer, spare part availability) autonomously after mobile tool integration. Within the paper-based process a technician had to call the head-office to retrieve this data. Gained resources have been used in e.g., book keeping or administrative tasks. Again in cases 2,3 and 5 with a high degree of user participation work-load reduction was 50% whereas, in cases 1 and 4 the improvement reached 45 %.

Paper-handling time

The reduced paper-handling time for the technicians was 80% (e.g. from 30 minutes for job data capturing per job down to 5 minutes). This was due to the fact that double data entry could be eliminated completely (entering the paper-based form into a desktop-system). This improvement was observed in all case study companies whereas transition time (switching from the paper-based to the mobile tool supported process) was considerably longer in those cases with lower degrees of user participation (2-3 months: case 2, 3 and 5; versus 6 months: case 1 and 4).

Payback Period

The PP could be achieved within all case study companies within less than 3 years (for hard- and software components this should be under 3 years as the useful life span is relatively low). PP in the Telecom Company was 2.5 years and in the Utility- and IT Service Company was 1.5 years. In the Toll Collection Company it took 1.6 years. And in the Machine Construction Company only 1.3 years. Shorter PP-times have been observed in cases with a high degree of user participation. During the interviewees we found out that this was due to smoother adoption and transition phases of the mobile tool supported workflow. The time for double process execution, paper-based and mobile was reduced by about 6 months in cases with user participation in all development phases. Whereas, this could be a general characteristic of the companies and is related to a faster payback period the interview data provides strong evidence that this is linked to a higher degree of user participation. High user participation fostered tool acceptance and thereby reduced the time needed for switching from a paper-based to the mobile tool supported process.

Tool acceptance

Tool acceptance varied in the case study companies according to the degree of user participation versus user involvement. We could observe that, the higher the degree of user participation was in the development process of the mobile tool, the higher the acceptance and the intension of mobile usage after deployment was. In case studies, companies with little user involvement tool acceptance and workflow change have been cumbersome. In Case Study Company 2, 3 and 5 we observed a high user participation and high user acceptance, while in Case Study Company 1 and 4 we observed little user involvement and a low user acceptance.

Process Calculation

We present an example of a core business process (repair execution) of a process calculation before and after mobile tool deployment. The calculation is based on Case 3 and 4 but data is modified due to confidentiality reasons. We compare the process calculation with data from Case 4 to illustrate the variance. Reasons for (time) variance lay of course in the company size, application domain but also in the extent of user participation. Within those cases the same tool was implemented and adaptations of the interface have been minimal. Per working hour for IT-Service technicians $ 45 are considered. Duration is indicated in minutes. The number of customers is 100 and a repair task is executed 5 times per year at each customer. Data retrieval refers to the customer service order, address and SLA-rate.

Work Tasks	Duration in min. Case 3	Duration in min. Case 4	Cost in $ Case 3	Cost in $ Case 4
Receive data & print	5	8	3.75	6,00
Drive to customer & repair	60	90	45.00	67,50
Capturing of performance data (manually)	5	15	3.75	11,25
Capturing of performance data (electronically)	15	30	11.25	22,50
Sum	**85**	**143**	**$63.75**	107,25

Table 5: Process Calculation: Repair Execution before Mobile Tool Integration

After the mobile tool integration the same process can be executed without redundant data entry and electronic data retrieval and transmission by the technician is enabled. This lead to the following improvements:

Work Tasks	Duration in min. Case 3	Duration in min. Case 4	Cost in $ Case 4	Cost in $ Case 4
Data retrieval	2	2	1.50	1,50
Drive to customer & repair	60	90	45.00	67,50
Capturing of performance data (electronically)	10	5	7.50	3,75
Sum	**72**	**97**	**$54.00**	**72,75**

Table 6: Process Calculation: Repair Execution after Mobile Tool Integration

Savings per process step for the core process repair execution stand at $ 9.75. Multiplied by 100 customers and 5 annual executions of the process per customer this leads to a total saving of $ 4,875.00. For Case 4 the savings reach $ 23,000. The above presented calculation shows an isolated process (repair execution) for one period only. A more detailed and long-term calculation (3 to 4 years) lies beyond the scope of this paper and will be part of our future work.

Some ideas on the contribution of these findings are discussed in the following chapter.

DISCUSSION

We are aware that the value propositions (KPI improvement) within the five case studies might also have some biases caused by factors other than ser participation. Those factors could be:

User motivation

While we could investigate that acceptance and intension to use the mobile application increased when user participation was established during tool development; the users' motivation and technology affinity in general might have also influenced adoption speed and therefore several KPIs like the tool acceptance and the PP. The avoidance of redundant data entry and cumbersome data retrieval (e.g., customer data, availability of spare parts) were further important factors of user motivation for mobile tool usage and acceptance.

Training of mobile device usage and educational background

Although we have captured the degree of mobile device usage of the subjects and related them to performance measures (the time for job data capturing with the mobile application), training and educational background of users are important factors of ICT usage. The Telecommunication Company provided extensive trainings (several days in iterative cycle) but had a very low degree of user participation (only in the device selection phase). Adoption and acceptance took much longer than in the IT Service Providing Company where training was very short (one day) but user participation was established throughout the entire development cycle. The same stereotypes as in the Telecommunication Company could be observed in the Municipal Utility and the Toll Collection Company. In the Machine Construction Company same results as in the IT Service Providing Company have been achieved. These findings have domain bias of the IT-Service area and generalizability of results for other domains is a matter of discussion.

Organisational pressure

The degree to which management puts pressure on employees by directives was not a major research question of this work. Nevertheless, we assume that organisational pressure in German- and Austrian companies is comparable and further investigations of theses factors would lead into the work of cultural differences and the basic work of Hofstede (1991) which was not part of this research.

CONCLUSION

With this paper we presented the results from five industry case studies analysing the impact of user participation on the success of introducing mobile devices in business processes and positive impacts on business metrics. In our examination within the IT-Service sector 2 out of the 5 companies had a low degree of user participation. 3 companies had user participation within all phases of mobile tool development and business process redesign. The study gives evidence that user participation within the development process of mobile tools (a) leads to reduced adoption and transition barriers as well as (b) improvements in business metrics, especially the return on investment.

These findings provide a basis for further research on the value contribution of user participation and positive impacts of HCI investments on the achievement of corporate goals e.g. improvement of KPIs.

Working with the results, however, we should consider that the nature of case study research brings along some limitations. In particular, we should be aware that the results may be different when addressing other context situations. Further research will therefore focus on studies in order to evaluate these findings against the background of a larger empirical basis. Moreover, process calculations will be executed for long-term (3 to 4 years) observations where we will compare the savings and benefits of the mobility supported business processes against costs and investments.

REFERENCES

1. Anda, B. (2003) Empirical studies of construction and application of use case models, PhD Thesis, University of Oslo.
2. Barki, H. and Hartwick, J. (1989) Rethinking the concept of user involvement, MIS Quarterly, 13, 1, 53–63.
3. Basole, R. (2005) Mobilizing the enterprise: A conceptual model of transformational value and enterprise readiness, *Proceedings of the 2005 American Society for Engineering Management Conference*, Virginia Beach.
4. Basole, R. and Rouse, W. B. (2007) Towards the Mobile Enterprise: Readiness and Transformation, IDEA Group Publishing.
5. Benbasat, I., Goldstein, D. K., and Mead, M. (1987) The case research strategy in studies of information systems, *MIS Quarterly*, 11, 3, 369-386.
6. Creswell, J. W. (2002) Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 2^{nd} edition, Sage Publications.
7. Eisenhardt, K. M. (1989) Building theories from case study research, *Academy of Management Review*, 11, 4, 532–550.
8. El-Amrani, R., Rowe, F. and Geffroy-Maronnat, B. (2006) The effects of enterprise resource planning implementation strategy on cross-functionality, *Information Systems Journal*, 16, 1, 79–104.

9. Gibson, H. L. (1977) Determining user involvement, *Journal of System Management*, 20–22.
10. Gumpp, A. and Pousttchi, K. (2005) The Mobility-M-Framework for application of mobile technology in business processes, *Proceedings of GI Jahrestagung 2005*, pp. 523-527, Bonn.
11. Hartman, A., Sifonis, J. G., and Kador, J. (2000) Net Ready: Strategies for Success in the E-Conomy, McGraw-Hill.
12. Henneman, R. L. (1999) Design for usability: Process, skills, and tools, *Journal of Information Knowledge System Management*, 1, 1, 133–144.
13. Hirschmeier, Marcus: Wirtschaftlichkeitsanalysen für IT-Investitionen. WiKu-Verlag (2005). ISBN 3-86553-129-6
14. Hofstede, G. (1991) Cultures and Organizations - Software of the Mind. Intercultural Cooperation and Its Importance for Survival, Software for the Mind. Mcgraw-Hill Professional.
15. ITIL (2005) Introduction to ITIL, Tech. Report.
16. Ives, B. and Olson, M. H. (1984) User involvement and MIS success: A review of research, *Management Science*, 30, 5, 586–603.
17. Kaasinen, E. (2005) User acceptance of mobile services - value, ease of use, trust and ease of adoption, VTT Publications.
18. Keen, P. G. W. (1981) Information system and organizational change, *Communications of the ACM*, 24 , 1, 24–33.
19. Kornak, A., Teutloff, J., and Welin-Berger, M. (2004) Enterprise Guide to Gaining Business Value from Mobile Technologies, Wiley.
20. Lucas, H. C. (1974) Systems quality, user reaction and the use of information systems, *Management Informatics*, 3, 4, 207–212.
21. Muller, M. J. 2003. Participatory design: the third space in HCI. In the Human-Computer interaction Handbook: Fundamentals, Evolving Technologies and Emerging Applications, J. A. Jacko and A. Sears, Eds. Human Factors And Ergonomics. Lawrence Erlbaum Associates, Mahwah, NJ, 1051-1068.
22. Nielsen, J. (1993) Usability Engineering, AP Professional, New York.
23. Nielsen, J. (2003) Usability return on investment, Report, http://www.nngroup.com/reports/roi/.
24. Norton, D. and McFarland, F. W. (1975) The Information System Handbook, Dow Jones-Irwin.
25. Pedersen, P., Methlie, L., and Thorbjrnsen, H. (2002) Understanding mobile commerce end user adoption: a triangulation perspective and suggestions for an exploratory service evaluation framework, *HICSS-35*, 1–8.
26. Pousttchi, K. and Thurnher, B. (2006) Understanding effects and determinants of mobile support tools: A usability centered field study on it service technicians, *Proceedings International Conference on Mobile Business*, pp. 1-10, Washington.
27. Pousttchi K. and Thurnher, B. (2007) Adoption and impact of mobile-integrated business processes - Comparison of existing frameworks and analysis of their generalization potential, *Proceedings of Internationale Tagung Wirtschaftsinformatik*, pp. 273-290, Karlsruhe.
28. Robey, D. and Farrow, D. (1982) User involvement in information system development: A conflict model and empirical test, *Management Science*, 1, 73–85.
29. Roth, G. (2004), IuK-gestützte Prozesskostenrechnung für Netzwerke von Krankenhäusern, Berlin 2004, zugl. Diss. Univ. Mannheim 2004.
30. Rouse, W. B. (2006) Enterprise Transformation: Understanding and Enabling Fundamental Change, *Wiley Series in Systems Engineering and Management*.
31. Schuler, D. and Namioka,A. Participatory Design, 1993 CRC; 1 edition.
32. Standish Group. (2001) Chaos report.
33. Taylor, J. and McAdam, R. (2004) Innovation adoption and implementation in organizations: A review and critique, *Journal of General Management*, 30, 1, 17–38.
34. vom Brocke, J.; Buddendick, C.; Kelly, S.; Scolai, P. Ò. (2007) The Design and Evaluation of a Clinical Process Mapping Methodology (CPMM) to Support Information Systems (IS) Innovation in a Healthcare Context, *Proceedings of the 20th Bled eConference. eMergence: Merging and Emerging Technologies, Processes, and Institutions*, Bled, Slovenia.
35. Wang, Y., van de Kar, E., Meijer, G., and Hunteler, M. (2005) Improving business processes with mobile workforce solutions, *ICMB*, 1, 94–102.
36. Ward, J. and Peppard, J. (2002) Strategic Planning for Information Systems, John Wiley & Sons.