Mobilizing Customer Relationship Management – A Journey from Strategy to System Design

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Abstract

The bursting of the e-bubble affected expectations with regard to mobile initiatives and willingness to invest in them very negatively. In both academia and practice, there has recently been renewed interest in mobile business and mobile commerce. Now, however, business managers request detailed and thorough analyses prior to engaging in mobile initiatives. Multiple examples of successful customer relationship management (CRM) have appeared in academic and non-academic publications, although, none of them describe exactly how the transformation to a successful mobile CRM solution was accomplished. Consequently, we present a method, based on the business engineering, with which mobile business can be introduced to the CRM field. We provide a framework for the definition of a mobile CRM strategy as derived from the corporate strategy, suggest a method for the identification of the mobilization potential in CRM processes that is aligned with the strategy, and provide guidance with regard to the design of mobile information systems with which to support these processes.

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1. Introduction

In the late 1990s, at the peak of the e-commerce boom, overly optimistic expectations were geared towards internet-based commerce's next level: mobile commerce or m-commerce (e.g. [13]). After the e-commerce bubble had burst, m-commerce, too, failed to meet those expectations, a prominent example being the Wireless Application Protocol (WAP) ([36]).

Recently, mobile business (*MB*) and mobile commerce (*MC*) have begun to re-emerge as a promising field (e.g. [49]). Businesses now question the effectiveness of their (mobile) activities and investments more stringently than before. To ensure mobile activities' success, a structured method is required in respect of mobilization.

A normal approach to managing problems' complexity, is the division of the problem space into multiple sub-problem spaces with limited, manageable interdependencies ([14], [40]). The business engineering approach as defined by Österle is a framework that is specifically geared towards the subdivision of problems regarding business models' transformation in order to adapt to the information age ([31, pp. 353]).

An important aspect of designing business models is the interaction between businesses and their customers, which includes the management of customer-related information and business activities. This field of business is often referred to as customer relationship management *(CRM)*. The nature of business-to-customer interaction includes business processes spanning multiple locations (e.g. back office functions within the business' offices and direct customer contact at the customer's site). Applying MB principles and technologies to the CRM field does therefore seem to have reasonable potential.

No structured method has as yet been defined for the design of mobile solutions in the CRM field that will cover all of a comprehensive framework's perspectives, such as the business engineering framework. In this paper, we analyze different approaches to the design of MB, each of which address a different part of the business engineering framework, and from these synthesize a comprehensive method.

1.1. Research methodology and structure

Since the research goal is the construction of a new method, we follow the design science approach as described in [30] and [21]. "Design science […] creates and evaluates IT artifacts intended to solve identified organizational problems." "In the design-science paradigm, knowledge and understanding of a problem domain and its solution are achieved in the building and application of the designed artifact. […] Such artifacts are not exempt from natural laws or behavioral theories. To the contrary, their creation relies on existing kernel theories that are applied, tested, modified, and extended through the experience, creativity, intuition, and problem solving capabilities of the researcher." ([21]).

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We applied an inductive approach to the design of the method that we present in this paper. The current need for a structured method in respect of mobilization was revealed in an empirical study conducted by the authors' team: 60% of the respondents indicated that they were planning, or already implementing, a mobile CRM extension ([39]). None of these respondents indicated that they would or had used a structured method in the process.

We used the business engineering framework to structure such a method's requirements, subsequently analyzing the existing literature for contributions. The analysis yielded several approaches, each addressing a subset of the identified requirements. These approaches do not fit together smoothly because there are links missing between the different elements, e.g. business process analysis approaches do not indicate how benefits should be prioritized to provide a strategy-aligned solution.

Following [21], we begin with a description of the problem space (section 2). This includes a description of our business engineering research framework (2.1), a description of the CRM concept (2.2) and MB concepts in general as well as, specifically, MB and CRM's potential intersections (2.3). As suggested by [30], we analyze existing research that is relevant to our problem space in section 3. In section 4, we present a comprehensive method for the mobilization of CRM that covers all of the business engineering approach's perspectives by combining and linking the elements described in section 3. In section 5, we summarize the results and the possible implications. Section 6 concludes the paper and outlines options for further research.

2. Background

2.1. Business engineering

Business engineering (*BE*) is a structured approach to managing the transformation of businesses into a business model suitable for the information age ([31, pp. 13]). It divides a business transformation exercise into discrete projects, or a project portfolio, and separates the project into the conceptual design and the management of the change involved. The conceptual design is then again subdivided into three levels ([32]):

- On the *strategy* level, decisions regarding an enterprise's long-term development have to be made. This comprises decisions regarding strategic alliances, the company structure, market services offered, customer segments addressed, and the distribution channels.
- Within the *processes* level, strategic decisions are implemented. A process produces a company's services through the execution of a number of tasks with defined inputs and outputs. Questions to be answered in process development concern the planned process outputs, the optimal sequence and distribution of tasks, and the process management.
- The execution of processes is supported by *information systems* (IS) in the form of application software. The basis of information systems is information technology (IT), consisting of hardware, networks, and operating systems software.

Spanning all three levels, *change management* considers, among other things, the stakeholder groups, the profitability of the solution (the ROI analysis) and the project management ([32]). Although he does not refer to business engineering, Chen suggests similar building blocks for a methodology with which to build mobile computing applications ([6]), without specifically focusing on a particular type of mobile application (such as mobile CRM).

2.2. Customer relationship management

Following Shaw/Reed ([46]), we define customer relationship management (*CRM*) as a complex set of interactive processes that aims to achieve an optimum balance between corporate investments and the fulfilling of customer needs in order to generate maximum profit. CRM's origins can be traced to the relationship marketing (RM) management concept ([26]), which is an integrated effort to identify, build up and maintain a network with individual customers for the mutual benefit of both sides ([45, p. 34]). RM is of largely strategic character, and lacks a holistic view of business processes, although they are regarded as important ([33]).

Strategically, we consider CRM as viewing customer relationships as an investment that will contribute to the enterprise's bottom line. Customer relationships' design and management are aimed at strengthening an enterprise's competitive position by increasing customers' loyalty. While this extends beyond the use of IT, IT is still an important enabler of modern CRM.

Apart from RM's strategy-oriented as well as systems-oriented concepts, there are several CRM approaches with a special focus on business processes ([42]). Generally, CRM processes not only require transactional data, which can be automatically collected and stored in relational databases, but also a significant amount of knowledge. Furthermore, CRM processes are usually complex and only structured to a certain

extent. Consequently, they can be considered knowledge-intensive processes ([12], [43]). Besides developing an integrated view of CRM processes, it is therefore critical to address the management of knowledge flows from and to the customer across all communication channels as well as to enable the use of the knowledge about the customers. A detailed classification and description of business processes in the CRM field, with a particular emphasis on knowledge intensity, is provided by [15].

In the past, advances in IT had a significant influence on CRM, but were mainly focused on the IS layer and neglected their connections to CRM processes and strategy. The goal was to support the existing, isolated approach to dealing with customer relationships. With CRM philosophy aiming at creating an integrated view of the customer across the enterprise, these systems were connected and today form the building blocks of comprehensive, integrated CRM systems. According to the Metagroup, CRM systems can be classified into the following three sub-categories ([44]):

- *Operational CRM systems* improve CRM delivery's efficiency and support processes. They comprise solutions for marketing, sales and service automation.
- *Collaborative CRM systems* manage and synchronize customer interaction points and communication channels.
- *Analytical CRM systems* store and evaluate knowledge about customers for a better understanding of each customer and his behavior.

2.3. Mobile business and mobile CRM

Technological advancements in mobile communications enable new ways of doing business ([35]), often referred to as "mobile business" (*MB*) or "mobile commerce" (*MC*). While Turowski/Pousttchi ([48]) do not distinguish between the two but rather use the term "mobile commerce", Lehner ([24]) and Zobel ([53]) define "mobile business" as the application of mobile technologies to improve or extend business processes and open new market segments. They differentiate between "mobile business" and "mobile commerce", the latter being a rather subordinate *MB* field focusing on the handling of transactions. We follow Lehner and Zobel's more general understanding and concentrate on mobile technologies' application in order to support CRM processes (mobile CRM, *mCRM*).

Typical examples of mCRM are mobile marketing (*MM*), mobile sales force automation (*MSA*) and mobile field service (*MFS*), or mobile customer service (*MCS*). MM takes advantage of mobile devices' pervasiveness and the very personal nature that is typical of communication when using those devices (as perceived by their owners) (e.g. [3], [37]). MSA and MFS support sales agents and field service agents (e.g. [5], [48, pp. 196]) whose work is generally spread across multiple locations (e.g. customer sites) by giving them access to CRM systems and other required information from any location. MCS usually gives customers ubiquitous access to services to which they have subscribed (e.g. [28], [29]).

3. Related work

In this section, we analyze existing approaches which contribute to the mobilization of CRM. Following the business engineering framework, the analysis will be structured into strategy, process and information systems. Change management is supposed to be an ongoing effort associated with activities on all these layers (see section 2.1). In order to explicitly analyze change management approaches, we will deal with these in a separate section.

3.1. Strategy perspective

Zetie ([52]) outlines a mobile enterprise strategy's essential elements: Identification of *business values*, identification of *essential mobile services*, definition of the required *level of mobility and "wireless-ness"*, a strategic choice of *devices and platforms*, including an integration architecture, and, finally, a set of *system management and usage policies*. The choice of devices and platforms as well as that of policies will most likely be closely linked to a general IT strategy rather than being specific for a mobile CRM strategy. The business values and core services can obviously be specific to CRM, while a clear understanding of the required level of mobility and "wireless-ness" also depends on the application domain. Clarke ([7]), for example, envisages four types of general m-commerce value propositions (*Ubiquity, Localization, Personalization, Convenience*) that have specific instantiations in CRM, e.g. ubiquity could be a sales agent having access to a customer's history from anywhere. Colgate/Danaher ([8]) point out the importance of not only having a customer relationship strategy, but also executing it properly. Following the business engineering framework, the strategy is implemented by choosing proper processes and by redesigning them in compliance with the strategy and also by suitably communicating the strategy to the relevant stakeholders. Lockamy/Smith suggest linking strategy, processes and information technology and provide principles with which to do so ([27]). Following these principles, Schierholz et al. outline a framework of

customer-oriented strategy goals and provide recommendations regarding what to look for in processes to be mobilized ([41]). This framework identifies five high-level value propositions. Companies are advised to select one primary and one secondary goal and focus on the mobilization of processes with specific properties:

- *Price*
  Companies offering a low, transparent and fair price in comparison to others in the market should mobilize processes in which the business information's point of creation and point of action differ. This approach to mobilization avoids breaches in time and space, or media.
- *Customer intimacy*
  Companies offering an uncomplicated service on a personal level, thus establishing a one-to-one relationship with customers, should mobilize processes which support the customers' needs in spontaneous and unforeseeable situations.
- *Accessibility*
  Companies offering simple, anytime-anywhere-anyhow access to products should mobilize processes which extend the communication channels between them and their customers.
- *Innovativeness*
  Companies that are perceived as innovators or early-adopter of new, innovative technologies should mobilize processes with a strong external visibility.
- *Product quality*
  Companies offering the best product features in the market can not support their strategy through mobilization unless they offer products closely related to mobile technology or knowledge-intensive services.

This approach provides a starting point for a mobile CRM method which covers Zetie's first two prerequisites ([52]) and should be completed with elements for process analysis and design, system design and selection as well as change management.

3.2. Business processes perspective

Valiente/van der Heiden suggest a five-step method with which to analyze business processes in order to identify mobilization potential ([50], [51]). Basically, they suggest mapping existing processes with a standard process modeling method, adding location and mobility information to all activities and identifying the information dependencies between location and mobility. Afterwards, the mobility of the actors in the model is increased (or "complicated" as Valiente/van Heiden call it), which, if there are dependencies between the mobile actors or actors at differing locations, is then supposed to indicate potential for mobilization. In a final step, these potentials should be evaluated for exploitability by means of mobile information systems (*MobIS*). Valiente/van Heijden do not suggest a way of transforming the artificially complicated process model into realizable processes. Moreover, their method does not cover the focus on specific goals which should be derived from a pre-set strategy. The compliance with desired goals only occurs in a final step. Virtually all processes within an organization would therefore need to be analyzed, which seems impracticable. With their mobile business process landscaping (*MBPL*) method, Gruhn et al. ([22], [19]) aim to overcome this weakness. They suggest the multi-layered modeling of business processes, beginning on a macro layer that describes the core business processes on a level such as "there is a sales process" ([22, p. 242]). They suggest identifying dependencies between processes and organization units by adding location and mobility attributes, similar to that suggested by Valiente/van Heiden.

The next levels of analysis are the function level, the activity level and, finally, the information object level. After modeling each level, only those elements of the model in which a mobility potential has been identified, need to be investigated further. In our opinion, there is the risk that, in the beginning, potentials will be overlooked in MBPL due to the abstraction level being too high, which means that the dependencies between units will be internalized into a larger unit and will, consequently, not appear in the model. For example, on the level of "there is a sales process", the dependencies between the field sales agents and their back-office functions are internalized.

There is obviously a conflict between the goals of practicability and the accuracy of the modeling method. Davenport et al. ([10]) focus specifically on the reengineering of knowledge-intensive processes and find that the involved individuals will most likely not accept an overly structured approach. Since we have already identified CRM processes as knowledge intensive, this should also be applied in our context. A designed solution's acceptance is more likely to be achieved if the final users are involved in the design process. Peffers/Tuunanen thus suggest applying participative methods, such as the critical success chains (*CSC*) method ([34]), to leverage the available knowledge within the organization. In our opinion, a combination of formalized analytical methods, such as MBPL, and participative methods, such as CSC, should be applied.

3.3. Information systems perspective

In contrast to IS, which are designed for stationary use (i.e. usually on a standard desktop computer or laptop), a MobIS does not only consists of software. The choice of access devices is large, and the choice made impacts the further design decisions, since the devices are not standardized to a level equal to that of desktops. The options include the laptop, already known from stationary IS, or its "twin", the TabletPC. Common choices are handheld devices such as personal digital assistants (PDA) and cellular phones as well as a combination of the latter, the so called smartphones. Analysts such as Forrester Research regularly provide overviews and classifications of such devices ([17]).

The choice of device should obviously be made with respect to the intended application context ([1], [20]). As far as the software platform is concerned, the device decision usually determines the device platform as well, but for a MobIS there are still further multiple choices. Vendors such as SAP, Siebel and Microsoft offer mobile clients for their CRM products, which can either be run locally on different platforms, such as PalmOS or Windows Mobile (in connected or disconnected mode), or on a mobile web browser as a thin client (only in connected mode). This already implies suitability in respect of different tasks as defined in the process analysis. Obviously, applications which can also be run in disconnected mode support a wider range of locations and mobility requirements, since wireless networks (cellular or other) are not as yet reliably available in every situation.

Besides clients for mobile users, their integration with the backend enterprise applications is crucial to fully exploit the mobile potential. Standard offerings, such as SAP, Siebel or Microsoft's mobile CRM, integrate via their enterprise's CRM systems. However, examples from the industry are often based on custom-developed solutions, for which there are multiple technical approaches to integration. Sairamesh et al. propose an architecture which specifically takes disconnection, synchronization and application context into consideration ([38]). A prototypical implementation of their architecture, based on Java technologies, promises a generic and flexible applicability. Mobile middleware is already available as well, examples being the Java-based IBM Everyplace product family, or the .NET-based Microsoft framework that is also available in a compact edition suitable to mobile devices.

An implementation that integrates a complex domain-specific enterprise application such as CRM, is, however, still lacking. Shepherdson et al. suggest a framework called "mPower" which is based on multi-agent technology and provides a reference implementation that supports a mobile workforce ([47]). Baresi et al. take a different approach and extend stationary workflow management approaches to distributed and mobile workflows ([4]), thus providing a formal method with which to model these workflows based on the business process execution language (BPEL).

None of these approaches provide a link to the process analysis as described in section 3.2, though. Consequently, the activities used in the system model have not been methodologically derived, and the attributes included in the description are mostly technology driven instead of reflecting business requirements.

3.4. Change management perspective

Multiple analyses have been done of consumer acceptance of mobile services and applications. Leung/Cheung suggest that consumers' attitude towards mobile marketing is dependent on marketing messages' informativeness (enhanced by personalization and localization) and entertainment (defined by perceived joy, perceived playfulness and flow) ([25]). Anckar et al. [2] analyzed consumers' adoption of mobile commerce applications and found that adoption/rejection decisions were determined more by the perceived benefits than by the perceived barriers on which models, such as the technology acceptance model ([11]), focus. Constatinou et al. support this by finding that the price of mobile services (obviously the counterpart of its value) "remains the most important attribute" ([9]).

Very little research investigates the adoption of mobile applications in a business context. In this context, factors such as employer policies can obviously override individual preferences. Nevertheless, user acceptance is a critical issue. Haugset, for example, finds that smaller devices are not necessarily better and that "supporting nomadic work must be done in agreement with the overall work context" ([20]). Allen/Wilson ([1]) support this as well as a result of experiences with a MobIS for a UK police force. In both works, case studies reveal that failing to analyze mobile workers' actual work contexts leads to the unintended use of the MobIS, or even flat refusal to use it. Lee et al. ([23]) apply Goodhue's task-technology-fit model ([18]) to explain mobile applications' performance. They find that individual user characteristics play an important role in mobile applications' adoption and resulting performance. None of these models provide recommendations on how to

address mobile applications' critical design or change management factors during their introduction.

Glissmann et al. propose a participative method for the design of mobile user interfaces which emphasizes the importance of involving the end user in the design, and covers the choice of devices, client type (online vs. offline vs. hybrid) and integration platform according to the task requirements ([16]). Nevertheless, measures that should accompany the transformation, such as communication and employees' modified objectives, have not as yet been conceptualized.

4. A method for the mobilization of CRM

In the previous section, we analyzed existing works that could contribute to a comprehensive method with which to mobilize CRM. In this section, we will synthesize a comprehensive method from these approaches and fill the identified gaps by linking the different pieces. Since change management is an ongoing task that accompanies the activities at all other business engineering levels (see section 2.1), the change management aspects adapted from section 3.4 will be described within the strategy, process and information systems' perspective. Figure 1 offers an overview of the method.

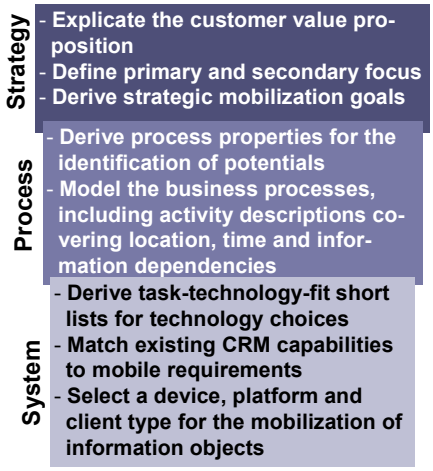

Figure 1: Overview over the proposed method

4.1. Strategy perspective

To cover Zetie's first two essential requirements ([52]), we apply the approach as suggested by Schierholz et al. ([41]). The business values to be realized by the mobilization of CRM should be derived from the general market strategy and the company's customer value proposition: one primary value proposition and one secondary should be selected. With regard to the primary proposition, the company should strive for an undisputed market leadership in customers' perception, while it is sufficient to be better than the market average as far as the secondary proposition is concerned. It is necessary to maintain market average in all other categories. This customer value proposition must be clearly communicated to all employees in order for them to act accordingly (cp. [8]). This can be achieved by explicating the market strategy as used in the framework and according to which Schierholz et al. classify the cases referenced in [41].

By following these authors' recommendations, the properties which qualify business processes for mobilization can be derived from the strategic focus. To allow for the best possible match of these goals as well as the best possible common understanding of their explication, key people from all stakeholder groups should be involved in this process. This includes the *general management*, who sets the corporate strategy, the *sales and service personnel*, who will eventually have to execute the strategy using the newly designed MobIS, and the *IT management*, who will be responsible for the MobIS's implementation, operation and maintenance. Since the customers are (or should be) the focus of all CRM activities, it would be ideal if key *customer representatives* could also be involved. This could prevent business models or value propositions being defined which customers do not desire or are unwilling to pay for.

It should be explicitly mentioned that the values which were not chosen as primary or secondary propositions, should still be taken into consideration, because a mobile initiative might be required to maintain the market average. All the above stakeholders should define and prioritize the mobilization initiative's goals.

4.2. Business process perspective

This prioritized list of mobilization goals should be the input for the business process analysis. We suggest using the MBPL approach as defined by Gruhn et al. ([22], [19]) as a methodology, because its layers of abstraction allow manageable process modeling. We do suggest, though, including stakeholders from the operational business unit and IT staff in the business processes' modeling and in the identification of mobilization potentials. This is to prevent potentials from being overlooked due to the high abstraction layers in the beginning. Consequently, staff members who are operationally involved in the processes should have an in-depth knowledge of the processes and should be able to point out dependencies that are underneath a level of abstraction early enough. To encourage staff members' acceptance of newly

designed processes, it appears important that they be allowed to influence the design process (cp. [10]).

Beginning with a high level of abstraction, the business processes are modeled by using an extended standard process design language as suggested by Gruhn et al. The extension includes activities' location and mobility requirements as well as the dependencies between model elements (e.g. actors, activities). Time constraints should also be modeled to allow conclusions on how up-to-date the information in the process must be (e.g., having the previous day's data could be sufficient as this would allow the nightly synchronization of data, while real-time accuracy would require online access). Dependencies which connect elements in different locations, or with externally determined (i.e. not self-chosen) mobility, are indicative of a mobilization potential. Mobility potentials should be modeled in increasing detail until the flow of information objects is modeled on the last level. The information objects used in these flows should then be described again, using a standard modeling language such as UML-class diagrams. These information objects also need to be connected to the information systems which handle them. Calendar entries are, for example, handled by a personal information management application as well as a corporate scheduling application while data warehouses usually hold customer master data.

Once potentials have been identified, the involved information objects and information systems can be assumed to be mobile, and activities bridging the dependencies can be removed from the process. If, for example, an existing process involves a sales agent who begins his work day by picking up the latest customer histories as well as his daily schedule at the office, visits the customers on his schedule, makes appointments with them, modifies contracts, signs new contracts etc. and finally returns to the office to enter the modified and new data into the enterprise systems, there are dependencies between the "visit customer" activity and the "customer histories" information objects, while the "visit the office" activities are bridging activities. By mobilizing the information objects, the bridging activity could be eliminated.

The value of this mobilization potential should also be assessed in cooperation with the employees who are involved in the modified processes. The mobilization's value lies in different dimensions (cp. [7]). It is possible that not all of these values could be easily converted into a financial benefit. The involved employees' inputs should therefore be used to prioritize the potentials relatively. Furthermore, the values' priorities should be matched with the strategic goals from the analysis described in section 4.1.

The final document of the process analysis stage should be a prioritized list of modified processes that includes the models as well as a detailed description of the newly designed processes, the affected information systems and the required functionality within these information systems. Ideally, an explicit list of the modifications made should be compiled.

4.3. Information systems perspective

The description of the new mobile activities, as well as the information objects and information system functionality should be the input for the system design or system choice stage. In many cases, there will be some form of CRM system for stationary use, since a mobile CRM initiative is unlikely to be the first step in CRM. Consequently, the design of a MobIS for CRM is usually the extension of an existing IS with a mobile interface. This is exactly the goal of the generic method developed by Glissmann et al. ([16]), which now needs to be customized for CRM and connected to the process analysis described in section 4.2.

As a first step, Glissmann et al. suggest a requirements analysis to identify the mobile users, their personalization needs (e.g., a sales agent might want an overview of only those customers for whom he is responsible) and their information needs. These data could be taken directly from the documents produced in the business process analysis. Subsequently, the conceptual design includes decisions about the devices as well as the client type. These are dependent on the mobility and "wireless-ness" classification as well as the mobile activities' time constraints as specified in the process analysis. A high degree of mobility, for example, requires small devices which allow single-hand use to enable usage on-the-go. Time constraints have an impact on the decision whether online access is required, or whether scheduled synchronization is sufficient. The activities' location properties also influence both the device selection (e.g. in certain rough locations a ruggedized device is necessary) and the type of software client (e.g. in remote locations cellular or even W-LAN networks are not available, which therefore requires offline use of software). Finally, the physical design must take the information flows as described by the process analysis into consideration and must match these to produce user interfaces specifically geared towards the activities that are to be supported. With mobile devices' typically limited input/output capabilities, certain functions' low complexity and high specificity specifically lead to the user interface's good task-technology-fit.

Both the device and platform decision gain another level of complexity if the MobIS under design targets consumers or other people external to the implementing

company. Usually there are no policies or standards governing these users' choice of device or platform, which means that the client software is required to support virtually all devices and platforms available on the market, both now and in the foreseeable future. A customer would most probably be very dissatisfied if a service to which he has subscribed is not available on his device and/or platform, and a mobile marketing campaign's effectiveness would be very limited if only a certain device or a certain platform is supported. In such cases, it is therefore highly recommended to focus on providing the client with widely available standards such as mobile e-mail, an SMS service, mobile browsers, or the micro edition of the Java standard.

Similarly, constraints regarding choices increase if the stationary CRM solution is based on a standard product such as SAP, Siebel or Microsoft. These products all have a mobile edition which offers a standard set of features. The customization options are, however, far more restricted. This problem has already been noted in the literature on the make-or-buy decision, both in general contexts as well as specifically in the CRM context. If standard software is deployed, it is highly recommendable to adapt the processes as intended by the standard software vendor, since the costs of customization might exceed the benefits of cheaper standard software in these cases.

During the design and implementation, we again highly recommend that end users should be frequently involved in the early stages, e.g. by doing usability tests with early prototypes. The details of knowledge-intensive activities, which are also characteristic of CRM, are especially difficult to describe in a few structured attributes, thus the task-technology-fit and a MobIS's suitability for these activities can best be estimated by the people who actually perform these activities ([20]).

5. Summary

The synthesized method that we presented in section 4 covers all aspects of the business engineering research framework. The method provides a framework for the analysis of corporate strategies and the derivation of goals for a mobile initiative and links them to a goal-oriented business process analysis method. This method extends existing business process analysis methods with mobility-specific aspects and identifies mobilization potentials in process and information system design. The output of the business process analysis is used as the input for a conceptual and physical system design, for which a structured procedure model is also presented.

The proposed method focuses on the analyses of business processes and the corporate benefits which can be realized by their mobilization. Nevertheless, the method could be applied to mobilize consumer services as well. To do so, a slightly different approach should be taken in the strategy perspective: in this case, the definition of customer requirements as the strategic goal should be the output. On the process level, the customer interaction activities should obviously be the sole focus of analysis. On the information systems level, different considerations should be taken into account when choosing devices and platforms, since a wider variety has to be supported. This speaks in favor of the use of "least common denominator" standards such as SMS (currently) or MMS (in the near future). Figure 2 depicts an overview of the benefits of the proposed method.

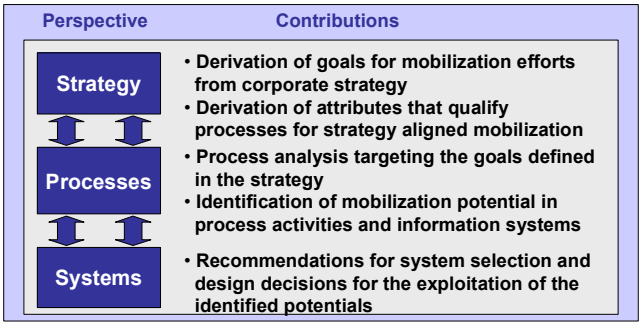

Figure 2: Benefits of the proposed method

6. Conclusions and further research

In this paper, we analyze a multitude of approaches in the field of mobilizing business processes, focusing on their applicability and application in the CRM context. The method helps business managers to design mobile CRM solutions which are in line with the goals defined by the corporate strategy. By applying this method, the risk of mobile initiatives in the CRM context is reduced, since it provides a structured and consistent procedure for the definition of goals, the identification of potentials for the fulfillment of these goals as well as recommendations for the systematic exploitation of these potentials. The application of this structured method should avoid the pitfalls of technology-driven IT initiatives which various companies have experienced, particularly with mobile technologies.

Further research should increase the described method's level of detail in order to ensure a recipe-like applicability in a business context. The activities on each level should be broken down into further detail and the output documents of each step should be described in a template-like manner. Further research should also provide sample questionnaires for - interviews with end users and documentation templates

for the analysis results, including description frameworks for the processes, activities and information objects identified in the process analysis. Decision criteria should also be compiled for the design decisions to ensure a more stable and faster application of the method.

Finally, in accordance with the design science research approach, the method requires evaluation. This evaluation should demonstrate the utility, quality and efficacy. Design science theory therefore suggests multiple methods for the evaluation of designed artifacts. In order to cover all the required elements of a mobile information system design process in the CRM context, the evaluation should specifically cover the method's organizational fit, usability in transformation projects as well as its completeness and consistency. We suggest that the method be evaluated by means of case studies in which a transformation of CRM occurs in order to adapt to the mobile world. Alternatively, detailed scenarios could be constructed in which the utility and applicability of the method could be demonstrated.

References

[1] Allen, D. and Wilson, T. D., "Action, interaction and the role of ambiguity in the introduction of mobile information systems in a UK police force", in: Lawrence, E., Pernici, B. and Krogstie, J. (Eds.), *Mobile Information Systems*, IFIP TC8 Working Conference on Mobile Information Systems, Oslo, Norway, 2004, pp. 15-36.

[2] Anckar, B., Carlsson, C. and Walden, P., "Factors Affecting Consumer Adoption Decisions and Intents in Mobile Commerce: Empirical Insights", in: *Proceedings of the 16th Bled Electronic Commerce Conference*, 16th Bled Electronic Commerce Conference, Bled, Slovenia, 2003.

[3] Balasubramanian, S., Peterson, R. A. and Jarvenpaa, S. L., "Exploring the Implications of M-Commerce for Markets and Marketing", *Journal of the Academy of Marketing Science*, Vol. 30, No. 4, 2002, pp. 348-362.

[4] Baresi, L., Maurino, A. and Modafferi, S., "Workflow Partitioning in Mobile Information Systems", in: Lawrence, E., Pernici, B. and Krogstie, J. (Eds.), *Mobile Information Systems*, IFIP TC8 Working Conference on Mobile Information Systems, Oslo, Norway, 2004, pp. 93-106.

[5] BenMoussa, C., "A Task-Based Framework of Styles for Mobile Applications to Enhance Salespersons' Performance", in: Lawrence, E., Pernici, B. and Krogstie, J. (Eds.), *Mobile Information Systems*, IFIP TC8 Working Conference on Mobile Information Systems, Oslo, Norway, 2004, pp. 51-64.

[6] Chen, M., "A Methodology for Building Mobile Computing Applications: Business Strategy and Technical Architecture", *International Journal of Electronic Business*, Vol. 2, No. 3, 2005, pp. 229-243.

[7] Clarke Iii, I., "Emerging value propositions for M-commerce", *Journal of Business Strategies*, Vol. 18, No. 2, 2001, pp. 133-148.

[8] Colgate, M. R. and Danaher, P. J., "Implementing a Customer Relationship Strategy: The Asymmetric Impact of Poor Versus Excellent Execution", *Journal of the Academy of Marketing Science*, Vol. 28, No. 3, 2000, pp. 375-387.

[9] Constantiou, I. D., Damsgaard, J. and Knutsen, L., "Strategic planning for mobile services adoption and diffusion: Empirical evidence from the Danish market", in: Lawrence, E., Pernici, B. and Krogstie, J. (Eds.), *Mobile Information Systems*, IFIP TC8 Working Conference on Mobile Information Systems, Oslo, Norway, 2004, pp. 231-244.

[10] Davenport, T. H., Jarvenpaa, S. L. and Beers, M. C., "Improving Knowledge Work Processes", *Sloan Management Review*, Vol. 37, No. 4, 1996, pp. 53-66.

[11] Davis, F. D., "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology", *MIS Quartely*, Vol. 13, No. 3, 1989, pp. 318-340.

[12] Eppler, M., Seifried, P. and Röpnack, A., "Improving Knowledge Intensive Processes through an Enterprise Knowledge Medium", in: *Proceedings of the 1999 ACM SIGCPR conference on Computer Personnel Research*, ACM SIGCPR conference on computer personnel research, 1999, pp. 222-230.

[13] Feldman, S., "Mobile Commerce for the Masses", *IEEE Internet Computing*, Vol. 4, No. 6, 2000, pp. 74-75.

[14] Ferstl, O. K. and Sinz, E. J., "SOM: Modeling of Business Systems", in: Bernus, P., Mertins, K. and Schmidt, G. (Eds.), *Handbook on Architectures of Information Systems*, Springer, Berlin etc., 1998, pp. 339-358.

[15] Geib, M., Reichold, A., Kolbe, L. M. and Brenner, W., "Architecture for Customer Relationship Management Approaches in Financial Services", in: *38th Hawaii International Conference on System Sciences 2005 (HICSS-38)*, Big Island, Hawaii, 2005.

[16] Glissmann, S., Smolnik, S., Schierholz, R., Kolbe, L. M. and Brenner, W., "Proposition of an M-Business Procedure Model for the Development of Mobile User Interfaces", in: Lawrence, E. (Ed.) *Proceedings of the Fourth International Conference on Mobile Business (mBusiness)*, Fourth International Conference on Mobile Business, Sydney, Australia, 2005, pp. 308-314.

[17] Golvin, C. S., Jackson, P., Charron, C. and McHarg, T., *The Next Wave Of Mobile Devices*, Research Report, Forrester Research, 2004.

[18] Goodhue, D. and Thompson, R., "Task-Technology Fit and Individual Performance", *MIS Quarterly*, Vol. 19, No. 2, 1995, pp. 213-236.

[19] Gruhn, V. and Book, M., "Mobile Business Processes", in: Böhme, T., Heyer, G. and Unger, H. (Eds.), *Innovative Internet Community Systems*, Third International Workshop, IICS 2003, Leipzig, Germany, 2003, pp. 114-133.

[20] Haugset, B., "Mobile Process Support Systems", in: Lawrence, E., Pernici, B. and Krogstie, J. (Eds.), *Mobile Information Systems*, IFIP TC8 Working Conference on Mobile Information Systems, Oslo, Norway, 2004, pp. 323-330.

[21] Hevner, A. R., March, S. T., Park, J. and Ram, S., "Design Science in Information Systems Research", *MIS Quarterly*, Vol. 28, No. 1, 2004, pp. 75-105.

[22] Köhler, A. and Gruhn, V., "Analysis of Mobile Business Processes for the Design of Mobile Information Systems", in: Bauknecht, K., Bichler, M. and Pröll, B. (Eds.), *E-Commerce and Web Technologies*, 5Th International Conference, EC-Web 2004, Zaragoza, Spain, 2004, pp. 238-247.
[23] Lee, K. C., Lee, S. and Kim, J. S., "Analysis of Mobile Commerce Performance by using the Task-Technology Fit", in: Lawrence, E., Pernici, B. and Krogstie, J. (Eds.), *Mobile Information Systems*, IFIP TC8 Working Conference on Mobile Information Systems, Oslo, Norway, 2004, pp. 135-154.
[24] Lehner, F., *Mobile und drahtlose Informationssysteme: Technologien, Anwendungen, Märkte*, Springer, Berlin, 2003.
[25] Leung, F. S. K. and Cheung, C. M. K., "Consumer Attitude toward Mobile Advertising", in: *Proceedings of the Tenth Americas Conference on Information Systems*, Tenth Americas Conference on Information Systems, New York City, 2004, pp. 2772-2775.
[26] Levitt, T., "After the Sale is Over", *Harvard Business Review*, Vol. 63, No. 5, Sep/Oct, 1983, pp. 87-93.
[27] Lockamy, A. and Smith, W., "A strategic alignment approach for effective business process reengineering: Linking strategy, processes and customers for competitive advantage", *International Journal of Production Economics*, Vol. 50, No. 2-3, 1997, pp. 141-153.
[28] Looney, C. A., Jessup, L. M. and Valacich, J. S., "Emerging business models for mobile brokerage services", *Communications of the ACM*, Vol. 47, No. 6, 2004, pp. 71-77.
[29] Mallat, N., Rossi, M. and Tuunainen, V. K., "Mobile banking services", *Communications of the ACM*, Vol. 47, No. 5, 2004, pp. 42-46.
[30] March, S. T. and Smith, G. F., "Design and natural science research on information technology", *Decision Support Systems*, Vol. 15, No. 4, 1995, pp. 251-266.
[31] Österle, H., *Business in the Information Age - Heading for New Processes*, Springer, Berlin, 1995.
[32] Österle, H. and Blessing, D., "Business Engineering Modell", in: Österle, H. and Winter, R. (Eds.), *Business Engineering*, Springer, Berlin, 2003, pp. 65-85.
[33] Parvatiyar, A. and Sheth, J. N., "The Domain and Conceptual Foundations of Relationship Marketing", in: Sheth, J. N. and Parvatiyar, A. (Eds.), *Handbook of Relationship Marketing*, Sage Publications, Thousand Oaks, 2000, pp. 3-38.
[34] Peffers, K. and Tuunanen, T., "Planning for IS applications: a practical, information theoretical method and case study in mobile financial services", *Information & Management*, Vol. 42, No. 3, 2005, pp. 483-501.
[35] Raisinghani, M., "Mobile commerce: Transforming the vision into reality", *Information Resources Management Journal*, Vol. 15, No. 2, 2002, p. 3.
[36] Ramsay, M., "Mildly irritating: A WAP usability study", *Aslib Proceedings*, Vol. 53, No. 4, 2001,
[37] Reichold, A., Schierholz, R., Kolbe, L. M. and Brenner, W., "M-Commerce at Helsana Health Insurance: Mobile Premium Calculator", in: Martin, D. C. (Ed.) *Proceedings of the DEXA '03 - Workshop Mobile Commerce Technologies and Applications*, Dexa '03, Prag, 2003, pp. 877-881.
[38] Sairamesh, J., Goh, S., Stanoi, I., Padmanabhan, S. and Li, C. S., "Disconnected Processes, Mechanisms and Architecture for Mobile E-Business", *Mobile Networks and Applications*, Vol. 9, No. 6, 2004, pp. 651-662.
[39] Salomann, H., Dous, M., Kolbe, L. and Brenner, W.; "Customer Relationship Management Survey - Status Quo and Future Challenges"; Working paper; 2005; Institut für Wirtschaftsinformatik.
[40] Scheer, A.-W., *ARIS - Business Process Frameworks*, Springer, Berlin etc., 1995.
[41] Schierholz, R., Kolbe, L. and Brenner, W., "Strategy Alignment of Mobile Solutions in Customer-oriented Business Processes", *Wirtschaftsinformatik*, Vol. 47, No. 1, 2005, pp. 17-24.
[42] Schulze, J., Thiesse, F., Bach, V. and Österle, H., "Knowledge Enabled Customer Relationship Management", in: Österle, H., Fleisch, E. and Alt, R. (Eds.), *Business Networking: Shaping Enterprise Relationships on the Internet*, Springer, Berlin, 2000, pp. 143-160.
[43] Schwarz, A., Junglas, I. A., Krotov, V. and Chin, W. W., "Exploring the role of experience and compatibility in using mobile technologies", *Information Systems & e-Business Management*, Vol. 2, No. 4, 2004, pp. 337-356.
[44] Shahnam, E., *The customer relationship management ecosystem. Application Delivery Strategies Delta 724*, Meta Group, 2000, http://www.metagroup.com/communities/crm/ads724.htm, last accessed on 17.11.2003.
[45] Shani, D. and Chalasani, S., "Exploiting niches using relationship marketing", *The Journal of Consumer Marketing*, Vol. 9, No. 3, 1992, pp. 33-42.
[46] Shaw, R. and Reed, D., *Measuring and valuing customer relationships: How to develop the measures that drive profitable CRM strategies*, Business Intelligence, London, 1999.
[47] Shepherdson, J., Lee, H. and Mihailescu, P., "mPower - A Component-Based Development Framework for Multi-Agent Systems to Support Business Processes", *BT Technology Journal*, Vol. 21, No. 4, 2003, pp. 92-103.
[48] Turowski, K. and Pousttchi, K., *Mobile Commerce: Grundlagen und Techniken*, Springer, Berlin, 2003.
[49] Urbaczewski, A., Valacich, J. S. and Jessup, L. M., "Mobile Commerce - Opportunities and Challenges", *Communications of the ACM*, Vol. 46, No. 12, 2003, pp. 31-32.
[50] Valiente, P. and van Heijden, H.; "A Method to Identify Opportunities for Mobile Business Processes"; Working paper; 2002; Stockholm School of Economics, http://swoba.hhs.se/hastba/papers/hastba2002_010.pdf
[51] van der Heijden, H. and Valiente, P., "The value of mobility for Business process performance: Evidence from Sweden and The Netherlands", in: *Proceedings of the European Conference on Information Systems*, European Conference on Information Systems, Gdansk, Poland, 2002.
[52] Zetie, C., *Essential Elements of a Mobile Enterprise Strategy*, Research Report, Giga Information Group, 2002.
[53] Zobel, J., *Mobile Business und M-Commerce - Die Märkte der Zukunft erobern*, Hanser, München, 2001.