Capability-oriented Modeling of the Firm

Daniel Beimborn, Sebastian F. Martin
E-Finance Lab, Institute of Information Systems
Johann Wolfgang Goethe University Frankfurt, Germany
{beimborn|smartin}@wiwi.uni-frankfurt.de

Ulrich Homann
Microsoft Corporation
Redmond, WA, U.S.
ulrichh@microsoft.com

Abstract

From the theories of the resource- and competence-based view we derive a capability-based modeling paradigm for representing business functions and processes. This method enables analyses of optimal process cuts within business process outsourcing decisions and gives a valuable complementary view of a firm as a structured network of capabilities.

In a case study approach, the derived modeling paradigm is applied to a particular segment of the banking business (credit business) and it is shown that this approach can deliver added value in particular strategic decisions. We identify areas of future research in developing strategic competence and process measures to make the theories named above more applicable to manager's decisions.

Keywords: Resource-Based View, Competence-Based View, Capability Modeling, Outsourcing Decision Support

1 Introduction

In the last years, a strong trend towards industrialization activities like process analysis and re-designing activities, information technology and business process outsourcing, as well as mergers and acquisitions has been observed in the German banking industry. This industrialization trend is mostly caused by an enormous consolidation pressure (Krabichler and Krauß 2003). Although this domain of strategic management is surrounded by many theoretical and empirical research works, the decision-supporting suggestions extracted from these works are often of a rather generic nature and do much less frequently provide an approach, which can be directly used by decision makers. The following work is based on theoretical insights into the resource-based view (Wernerfelt 1984) and the competence-based view (CBV) (Prahalad and Hamel 1990) as well as on experiences we obtained while conducting different research projects in the financial services industry. The paper focuses on providing a theory-based modeling and analysis approach which is able to complement process-based analyses for strategic decisions in the domain of cutting and modularizing processes into services and to determine optimal sourcing strategies. Our approach should enable managers to get a consistent picture of a firm's capabilities as well as of the relationships between them.

Chapter 2 gives a short overview of the theoretical bricks we will use as a fundament for our work and extracts strategic indicators which could be used in the developed approach. Chapter 3 discusses existing process modeling and redesign methods.

Chapter 4 forms the core of this paper. It introduces the concept of capability modeling (4.1) and applies it to a subsection of a bank's business, to show the added value this method can provide particularly in the context of business process outsourcing (BPO) (4.2). The final part of this chapter contains a first critical evaluation of the proposed method (4.3). Chapter 5 gives a short conclusion and highlights the next steps of our work.

2 Theories of the Firm

In order to support strategic decisions, e.g. to determine capabilities that should be outsourced, several theories have been developed during the last decades. In particular, theories of the firm, esp. the resource-based view (Penrose 1959; Wernerfelt 1984) and transaction cost economics (Coase 1937; Williamson 1985) have been cited in the overwhelming fraction of papers focusing on outsourcing or analog organizational questions. Additionally, (core) competence-based view (Prahalad and Hamel 1990) has been taken into account in the last years.

In the following, we give a short overview over the most important theories relevant in the context of our work. Later on, when introducing our approach, we will link back to the relevant theoretical bricks.

2.1 Theoretical foundation

The resource-based view of the firm (RBV) (Penrose 1959; Wernerfelt 1984) and its extension, the competence-based view of strategic management (CBV) (Eisenhardt and Martin 2000; Henderson and Cockburn 1994; Prahalad and Hamel 1990), provide an explanation to the question why firms are able to achieve and keep competitive advantage on the market. By putting the focus on the internal organization of the firm, the RBV claims that sustainable competitive advantage derives from a firm's specific bundle of resources. This perspective argues that resources have to be rare, inimitable and lack substitutes in order to confer competitive advantage (Barney 1991; Wilcox King and Zeithaml 2001).

Prahalad and Hamel outline that the source of competitive advantage is to be found in the management's ability to identify the *core competencies* of a firm, i.e. "consolidate corporate-wide technologies and production skills into competencies that empower individual businesses to adapt quickly to changing opportunities" (Prahalad and Hamel 1990).

In this paper, we refer to Wade & Hulland's definition of *resources* as "assets and capabilities that are available and useful in detecting and responding to market opportunities or threats" (Wade and Hulland 2004). According to this, *capabilities* are a subset of resources, defined by Wade and Hulland as "repeatable patterns of actions in the use of assets to create, produce and/or offer products to markets". Capabilities are thus capacities or abilities within a firm, which can be linked together as business processes, in order to enable a specific purpose or outcome. They consist of one or more workflows and routines that manage the interaction among a firm's resources. We regard *competencies* as being the cross-functional integration and coordination of capabilities (Javidan 1998). Finally, *core competencies* are those competencies, that

1. provide potential access to a wide variety of markets,
2. must contribute to the perceived customer benefits of the end product and
3. are difficult for competitors to imitate (Prahalad and Hamel 1990).

An organization's capabilities form a nested "hierarchy of integration" (Grant 1996). At the base of the hierarchy are granular capabilities, representing for example specialized knowledge held by individual organizational members. Those capabilities are integrated into broader functional capabilities. As we move up the hierarchy, the capabilities become less

task-specific and more general and the span of specialized functionality being integrated broadens (Grant 1996). In our concept of capability modeling, which will be discussed in chapter 4, the hierarchy of nested capabilities culminates on the highest level in five generic capabilities which can be found in almost every company: “developing products and services”, “client interaction”, “fulfilling customer demands”, “managing and controlling the enterprise”, and “collaborative activities” (see section 4.1).

Most of the literature on RBV and CBV is of an explanatory nature, pointing out that firm-specific resources are the enablers of competitive advantage and, implicitly, are at the origin of heterogeneity among firms on the market. Parts of it (Dibbern and Heinzl 2001; Roy and Aubert 2000) give an explanation on how outsourcing of resources can affect a firm’s ability to achieve and keep sustained competitive advantage.

Papers with a normative character, which address questions like how competencies can be identified within a firm or which describe frameworks and tools to support managerial decisions (Javidan 1998), are rather scarce and mostly address decisional issues on a generic level. Attempting to make a contribution in filling this gap, the remainder of this paper concentrates on a framework for modeling a firm’s pool of capabilities for a valuable complementary view on a firm’s capabilities network. Furthermore, we outline the main features of a tool that empowers managers to make strategic decisions from a resource-based point of view.

2.2 Key indicators to support strategic decisions

In this section, we extract key indicators for evaluating a firm’s capabilities from the introduced theories, which should provide managers with a means to decide whether or not a capability contributes to one of the firm’s core competencies (and - if e.g. applying them to an outsourcing decision - therefore should be kept in-house).

Inimitability

The inimitability of resources is considered by many authors as being one of the key factors of competitive advantage (Barney 1991; Peteraf 1993; Prahalad and Hamel 1993; Rasche 1994; Reed and DeFillippi 1990). For example, the reason for Penrose’s claim that the firm’s accumulated pool of knowledge can be a source of sustained competitive advantage is believed to lie in the nature of knowledge, which is rather “experience-based” than “objective” (Knudsen 1995), thus making it difficult to be imitated by other firms, because of its difficult transferability.

Although Porter argues that “barriers to imitation are never insurmountable” (Porter 1985), the height of those barriers is a determinant factor for how contestable or how sustainable the firm’s advantage will be (Reed and DeFillippi 1990). Reed and DeFillippi consider tacitness, complexity and specificity of a firm’s skills and resources as the generating factors for causal ambiguity which on its part can raise barriers of imitation.

In his discussion about factors which influence the rents from resources, Grant considers limited replicability and transferability of a resource position (due to geographic immobility, imperfect information, specific resources and immobile skills) as being generators of sustained competitive advantage (Grant 1991). We argue that limited replicability and transferability are causes for inimitability and subsume the above-named factors under the generic term of inimitability. Other drivers for “imperfect imitability” (Peteraf 1993) are seen by Peteraf to be property rights, non-recoverable costs and the aforementioned causal ambiguity.

Non-substitutability

A firm’s resources can not be sources for sustained competitive advantage, if there are strategically equivalent valuable resources that are themselves neither rare nor inimitable so they can be implemented by other firms (Barney 1991). Only capabilities which are hardly substitutable either by *similar* or by *different* capabilities can be sources of sustained competitive

advantage and should be treated in the same way as inimitable resources. While hardly substitutable capabilities contribute directly to a firm's competitive advantage, the provider of such a capability, in the case of outsourcing, would be likely to fail in delivering good quality service.

Interconnectedness
We introduce this indicator as a measure of how "deep" a capability is anchored into existing business processes. As stressed out in section 2.1, the capabilities of a firm can be viewed as a nested "hierarchy of integration" (Grant 1996). The more interconnections a capability is involved in (i.e. the higher the degree of integration), the more complicated it would be to extract it out of an existing context or even make simple changes to the capability itself. On the other hand, if a capability is (partly) self-contained, it may be easily exchanged. A concrete model for quantifying this measure is subject of further research. This measure can be partly automatically extracted from the number of outgoing and incoming connectors (see below), weighted regarding to the type of connector and the type of flow (digital flows for example are much easier to realize inter-organizationally than paper-based transmission).

Contribution to the perceived customer benefits of the end product
Every business consists of capabilities that enable it to carry out the necessary activities in order to produce goods or deliver services throughout the value chain. While some of these capabilities might perform adequately (or poor), some capabilities must be superior if the business is to outperform its competitors (Day 1994). These capabilities have a higher contribution to the generation of "perceived customer benefits" (Prahalad and Hamel 1990) than others and are therefore valuable. These "distinctive capabilities" (Day 1994) are part of a businesses key success factors. If, in addition, they can be used in different ways to "speed the firm's adaption to environmental change" (Day 1994) providing potential access to a variety of markets and are difficult to imitate, they should be considered as being part of a businesses core competence.

3 Process modeling and analyzing techniques

Business Process Reengineering (BPR) concerns the rethinking and redesign of business processes in a radical way, in order to achieve sustained improvements in quality, cost, lead time, flexibility, etc. (Gunasekaran and Kobu 2002). Kettinger et al. identify six stages of BPR: (1) envision, (2) initiate, (3) diagnose, (4) redesign, (5) reconstruct and (6) evaluate (Kettinger et al. 1997). During the diagnose stage, process documentation techniques are used for documenting existing processes. Within the same stage, the documented processes are analyzed using either the same or different methods. Table 1 gives an overview on the process documentation and analyzing techniques identified by Kettinger et al.:

Stage 3: DIAGNOSE		
Document Existing Processes		
• Activity-Based Costing • Computer-Aided Software Engineering • Data Flow Diagramming • Employee and Team Attitude Assessment	• Hierarchical Colored Petri Nets • $IDEF_{0,3}$ • Information Control Net • Job Analysis • Process Flowcharting	• Role Activity Diagramming • Speech Interaction Modeling • Structured Interview • Survey • Time Motion Study
Analyze Existing Process		
• Activity-Based Costing • Benchmarking • Cognitive Mapping • Computer-Aided Software Engineering	• Fishbone Analysis • Hierarchical Colored Petri Nets • $IDEF_{0,3}$ • Information Control Net	• Pareto Diagramming • Quality Function Deployment • Statistical Process Control • Value Analysis

Table 1: Process documentation and analyzing techniques (Kettinger et al. 1997)

Some of the techniques listed above are suitable for modeling as well as for analyzing a firm's business processes. We refer to them as "process mapping techniques" in the sense of Biazzo, who states that "[…] process mapping is based both on a precise strategy for reconstructing organizational actions and on a specific focus for the analysis" (Biazzo 2000). From the table above, we can extract five suitable techniques which fulfill both requirements of modeling and analyzing capabilities: Activity-Based Costing, Computer-Aided Software Engineering, Hierarchical Colored Petri-Nets, Information Control Net, and $IDEF_{0,3.}$

Activity-Based Costing (ABC) focuses on a company's activities which in literature are defined as "any discrete task that an organization undertakes to make or deliver a product or service" (Ittner 1999). By analyzing the costs generated by individual tasks, it tries to identify the real costs of each of a company's products. With ABC, activities are documented in written form rather then graphically illustrated. Computer-Aided Software Engineering (CASE) is exclusively used for software development processes and will not be further regarded. Petri Nets are well suited for the modeling and analysis of workflows, providing easy-to-understand graphical features (Salimifard and Wright 2001), but tend to become complicated to read, requiring skilled personnel when it comes to modeling complex workflows (Moldt et al. 2000). The Integrated DEFinition Methodology (IDEF) is a family of methods which cover various aspects like function modeling ($IDEF_0$), information modeling ($IDEF_1$), data modeling ($IDEF_{1X}$), simulation model design ($IDEF_2$) and process description capture ($IDEF_3$) (Mayer et al. 1992).

An in-depth comparison of the above listed techniques and the analysis of the underlying theories go beyond the purpose of this paper. The point we want to stress out here is that, while having their focus on issues like costs, activities, data, etc., they all fail to allow an integrated, resource-based view on capabilities, thus making the capability modeling concept we will present in the next chapter an ideal candidate for a valuable complementary examination of a firm's pool of resources.

4 Modeling a firm's capabilities

By making the firm's capabilities and their connections visible and providing corresponding performance measures, the *Capability Map* concept, introduced below, helps to capture a firm's capabilities structure and to solve related problems of reengineering and outsourcing. Capability modeling provides guidance on determining how changes in particular business areas or outsourcing particular business functions will affect the overall business and not only a singular business process.

Capability modeling does not aim at replacing other process improvement frameworks and initiatives; it is a new type of analytical framework that is complementary to common process modeling and analysis approaches and supports the operationalization of the RBV.

There are different optimization needs and strategies where the analytical technique of capability modeling can deliver added value when applied to the problem. For example, within a business process, bottleneck problems could occur, problems whose origin could often not be easily identified. If evaluating Business Process Outsourcing (BPO) options, it is often not clear which connections exist between different processes that, of course, contain hidden transaction costs and problems. Other application domains cover redesign strategies as e.g. change management.

4.1 Capability Map Concept

Earlier in this paper, a *capability* was defined as a particular ability or capacity that a business may possess or exchange in order to enable a specific purpose or outcome. In our concept, a capability additionally abstracts and encapsulates involved people, workflow, technology,

information, and service level expectations. It represents only the essential information needed to provide improvement of performance and to redesign analysis. Therefore, capabilities represent firm-internal encapsulable services, i.e. units of business functionality. In contrast, a *workflow* or *procedure* is the end-to-end group of activities that describes how a capability is performed, while a *business process* is the interconnection resp. a composition of capabilities to fulfill a market demand (Davenport and Short 1990).

Based on the concept of the "hierarchy of integration" (see section 2.1) given by Grant (Grant 1996) the *capability map* (CM) is a nested hierarchy of capabilities and a taxonomic diagram that describes the interplay of capabilities while doing business. It exposes all capabilities across the business ecosystem. It allows displaying several business processes within a single map, thus giving valuable insights on how these processes are related with each other, by using the same capabilities. Viewing the business as a network of capabilities and connections may help to overcome complex organizational and procedural boundaries, which may hinder strategic analyses.

As within Grants conception, whereby "*hierarchies of capabilities do not correspond closely with their authority-based hierarchies as depicted by organization charts*" (Grant 1996), a capability map does not necessarily fit with the organizational chart, which is the framework used by most businesses to describe their operating model. A capability map is a model of what is done – not who is accountable for what. Nevertheless, the organization chart is an important reference point for the capability model; it may in fact look similar in large parts and could be cross-referenced to the capability map.

In our concept, the first level of the CM draws five generic capabilities (*1st level capabilities*), which are present in almost every company (although customized naming would often fit more to special business taxonomies): developing products and services, client interaction, fulfilling customer demands, managing and controlling the enterprise, and collaborative activities (Figure 1).

Figure 1: Generic Capability Map – 1st level

On the second level, the 1st level capabilities are subdivided into more industry-specific capability groups or *2nd level capabilities*. (Because our research domain is primarily in the financial services industry, the visual examples in the following represent the capability map of a bank.) For example, "Sales" is a 2nd level capability within "Client Interaction". Capabilities are identified by a unique hierarchically structured ID (3.1 is a sub-capability of 3, 3.1.1 is a sub-capability of 3.1 etc.).

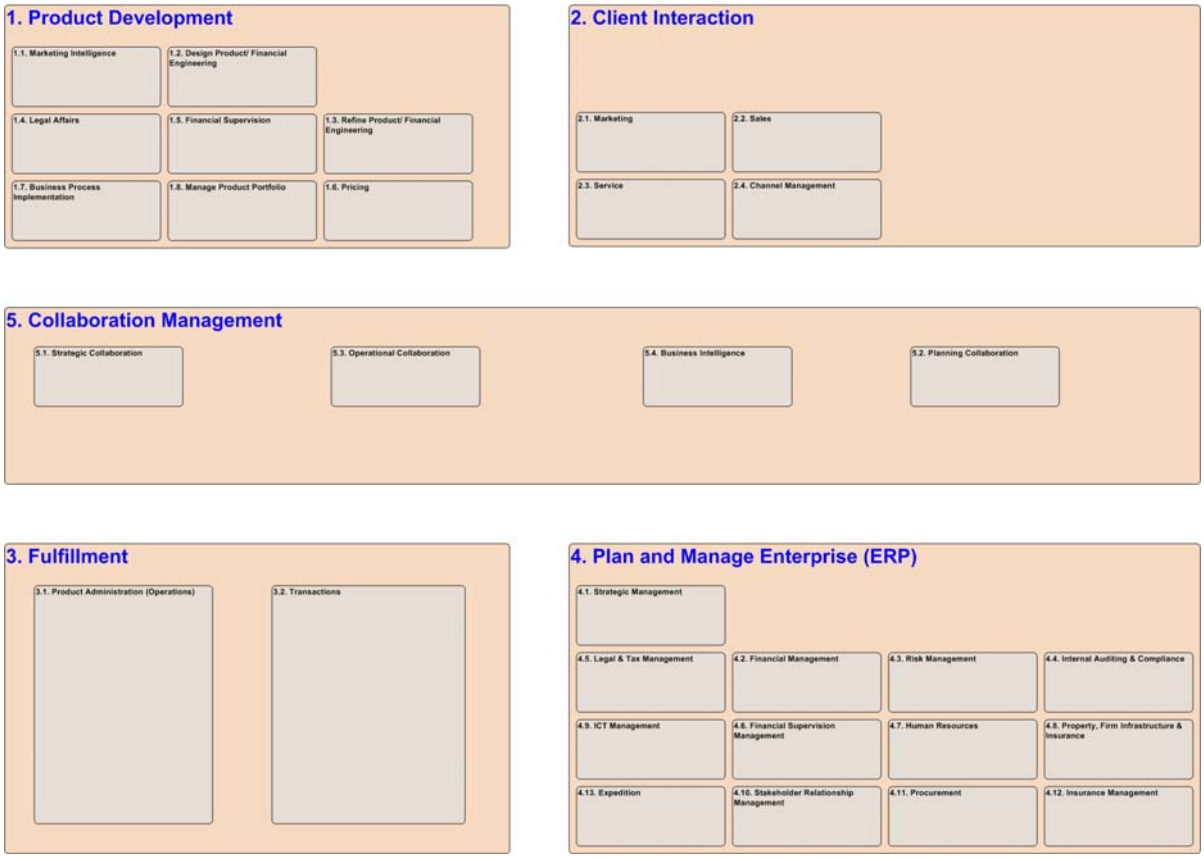

Figure 2: Capability Map of a bank – 2nd level

On further levels, these capability groups are decomposed into more granular capabilities resp. business functions. The maximum number of levels is not pre-determined; it depends both on the size and the complexity of the investigated business and on the particular demands of analysis. It is also not necessary to decompose all capabilities to the same level of granularity.

After modeling the capabilities in sufficient granularity, their connections have to be included. Because capabilities are regularly parts of many business processes, they provide some specific output which is input for any following process step (again represented by a capability). Therefore, these input/output connections will be modeled as uni-directional edges within the CM (so-called *process flow connectors*). Connectors may be drawn between capabilities on different layers. The main approach to building the map and getting the capabilities and the connectors extracted is to use existing process models or documentations, to transform appropriate process steps or groups of process steps into capabilities and to assign the process-internal sequences to the map in form of connectors.

Other types of connectors (which we have neglected in the visual examples, in order to keep them more transparent) are *support* and *control connectors*. A support connector exists when information is commonly passed to another capability. Exception handling, inventory returns, and verification (feedback) as well as inspection capabilities are examples of capabilities that would require supporting connectors. In contrast, a control connector is apparent when there is a capability that has no impact on the performance of other capabilities and if there is no input/output relationship. Compliance, management policy, engineering, and regulatory business capabilities often have influencing relationships on other capabilities, but are not I/O relationships.

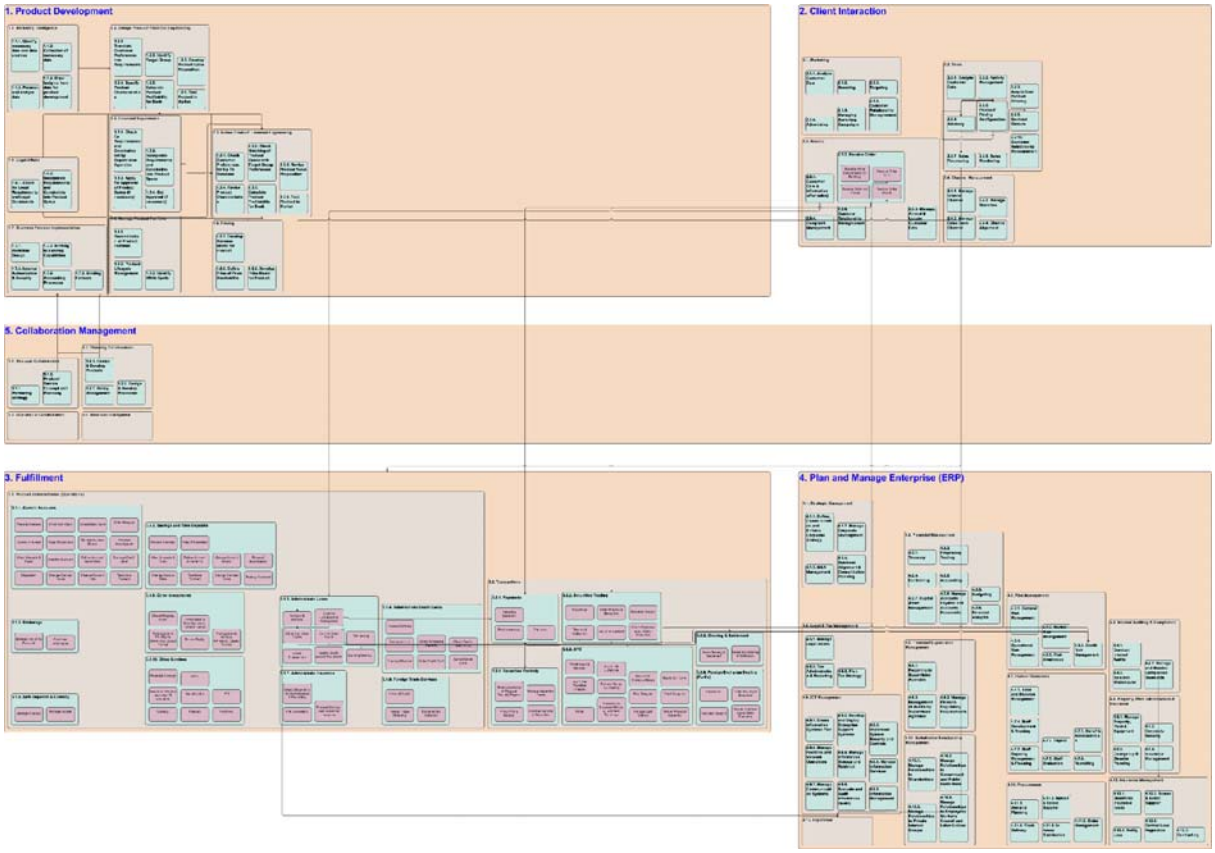

Figure 3: Capability Map of a bank – 3rd/4th level, including selected I/O connectors

Optional further steps of modeling – which we neglect in this paper – would be to cross reference the capabilities to organizational units as well as to HR and IT resources. Further, for representing market-based activities, capabilities can be linked to capabilities of business partners such as customers, customer-facing channel partners, suppliers, logistics and infrastructure providers, and financial providers (= the environment surrounding the business).

Having completed the capability map of the firm, each capability can be analyzed separately with regard to possible performance problems and questions of strategic impact, as suggested by the mentioned theories. After placing the introduced concept into the theoretical foundation and into the methodological classification given in the former chapters, an exemplary approach will be shown in the following section.

CM focuses on structuring a firm's capabilities while also encapsulating the particular assets, which are solely used by a specific capability. Therefore, a capability within CM represents the investigation object which is in the core focus of the RBV, while the CBV is more oriented on managing the integration and coordination of capabilities (= competencies). CM allows analyzing a firm's capabilities (as part of the resources) due to the theory-based indicators given in section 2.2, which are relevant for strategic decisions.

Since CM allows both, graphically representing a business as well as strategically analyzing its capabilities, we range this method within the class of process mapping techniques described earlier in chapter 3.

CM is not a tool for detailed capability maturity assessment (although this could and should be integrated into an analysis tool set). The focus is not to analyze singular capabilities in depth for reasons of optimization, but to provide an analysis and redesign tool for helping to locate performance problems (e.g. due to multiple business processes sharing the same capability) and to reconfigure the capability structure (e.g. outsourcing of specific parts).

4.2 Application to the Domain of Loan Processing

In summer of 2004 we conducted a case study and investigated the process of granting and managing mortgage loans of a small German private bank (named "ABCD" in this paper due to terms of confidentiality). Within this project, very detailed process documentation was generated[1], mapping single activities to the underlying information systems infrastructure (which applications are used by which process step). In this way, we created a basis for analyzing media discontinuities (when and how often does data need to be retyped from one application to another due to missing interfaces) within the investigated business process. Besides an analysis of these optimization opportunities, an additional goal was to evaluate the outsourcing potential for different parts of the process. This evaluation was based on a more comprehensive methodology, where CM was only one part of. (It is either the goal of this paper to develop a business process outsourcing decision support approach, nor to discuss the set of existing methods and underlying theories in this field. A valuable and extensive work in this field can be found in (Dibbern et al. 2004)).

The mortgage loan process of ABCD bank is shown on a more abstract level in Figure 4.

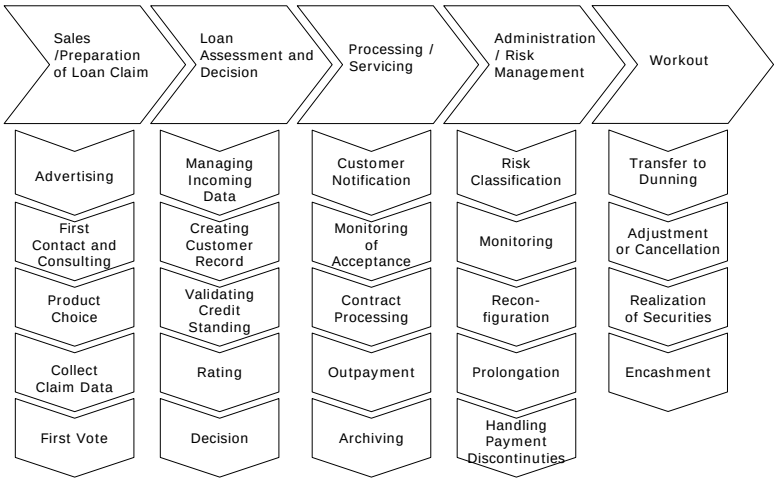

Figure 4: Mortgage Delivery and Management Process of ABCD bank

After modeling the workflows within each process step in a very detailed approach (UML activity diagrams), all activities were remodeled as encapsulated business functions resp. capabilities to place them into the hierarchical capability map. Figure 5 shows both the resulting positions of customer-near capabilities within the sales-capability (in the upper right corner) and the back office functions within the administration capability (in the lower left corner).

The process flow connectors between the front office and the back office are also shown in the capability map. These links represent all interactions (e.g. the transmission of the loan related documents) between front and back office during the loan process. Further, there is a rather intense exchange between loan processing and credit risk management within the bank's risk management (lower right corner). Each loan request has to be evaluated if it matches into the bank's preferred risk portfolio and, in the opposite way, if a new loan contract changes the bank's risk portfolio. When it comes to paying out the credit amount, the process leads to the "Transactions" capability.

[1] It is quite difficult to find any flow-oriented process documentation in any area of the financial industry in Germany.

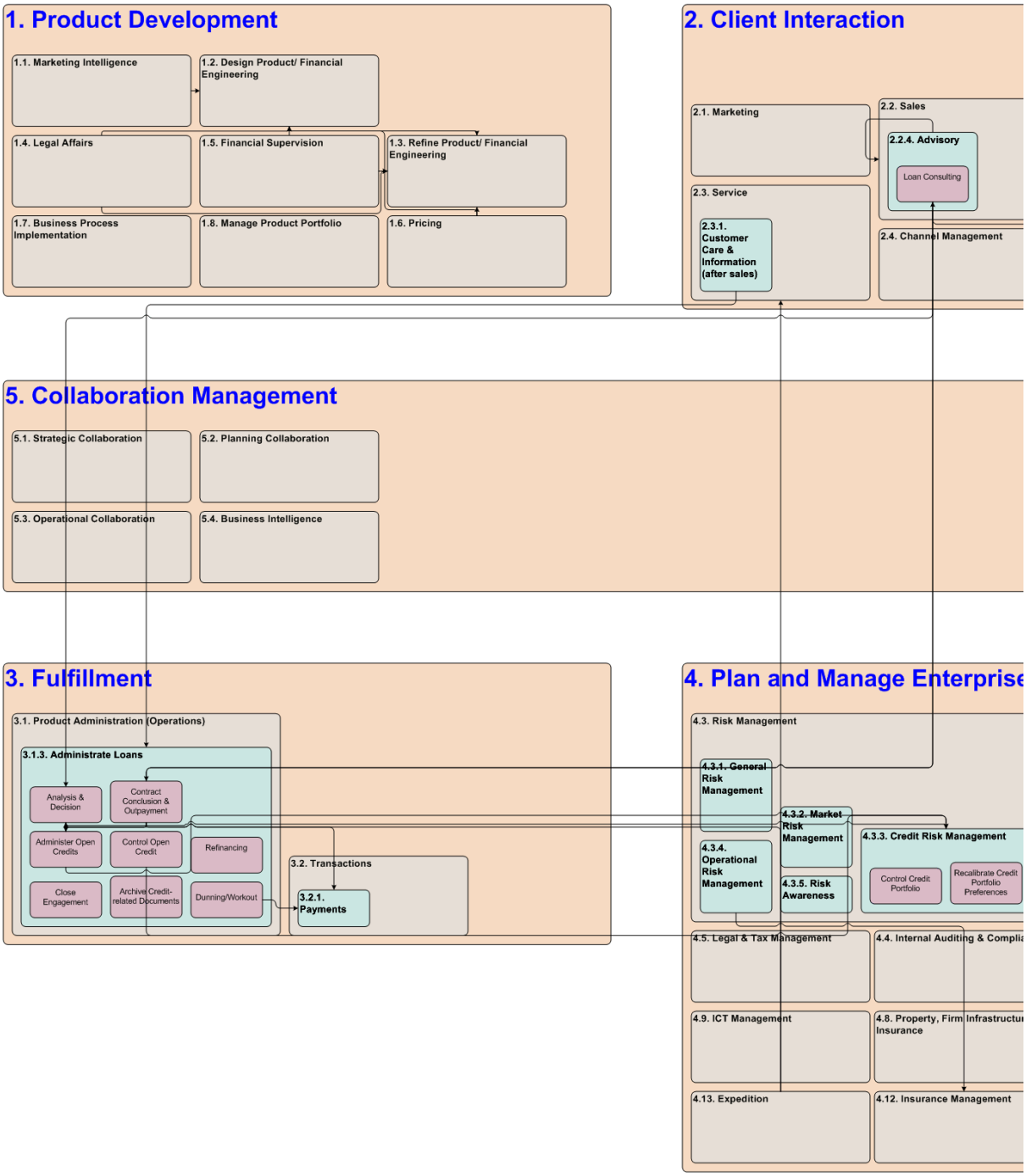

Figure 5 : Capability Map with focus on Loan Processing Capabilities (4th level)

In Figure 6, the capability “Administrate Loans” is shown in more detail. As the view becomes more detailed, more process flows are displayed between and within capabilities.

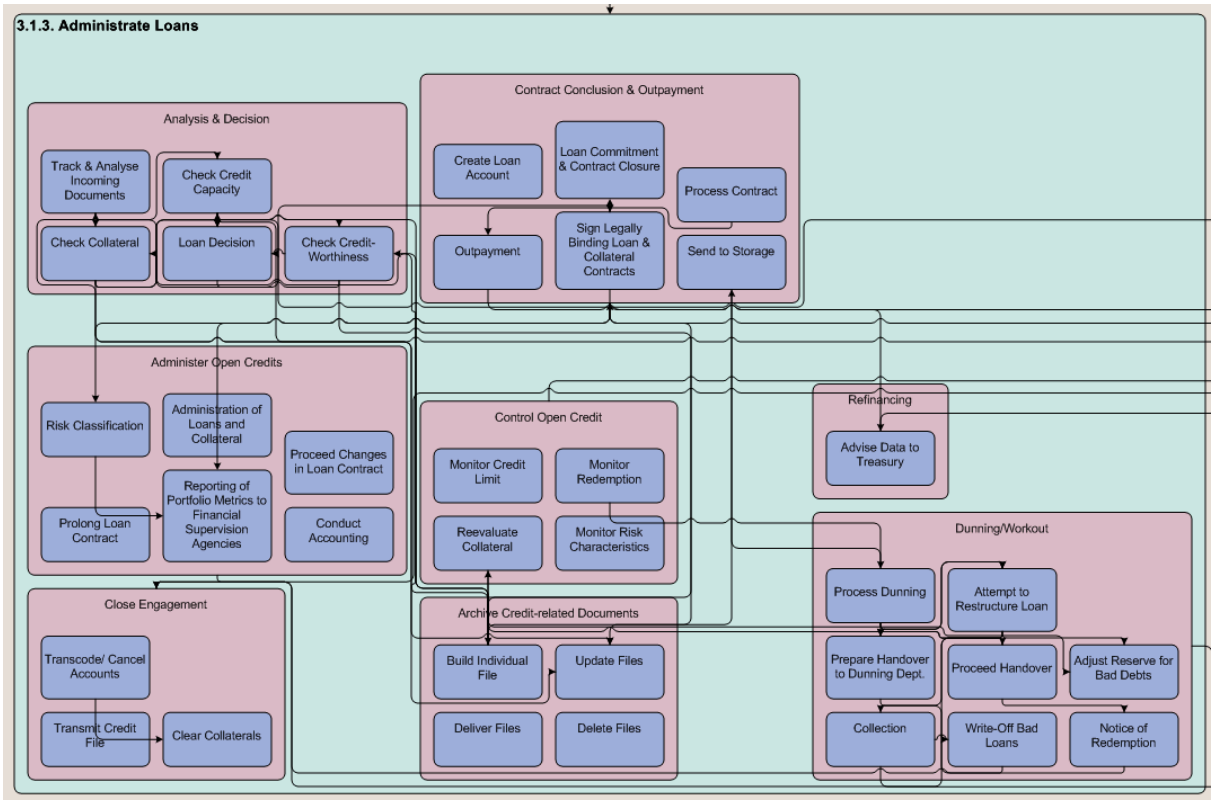

Figure 6: Detailed view of capability "Administrate Loans"

On a sufficiently granular level, the capabilities can be described by function-oriented measures. By using a capability cockpit in form of a graphical user interface (GUI), as shown in Figure 7, one can browse into each single capability and is able to query the properties and pre-defined absolute and relative (efficiency) measures. It is not goal of this paper to define a set of theory-based measures for this kind of cockpit. We just want to provide a first visionary draft, which could act as a starting point for refinements in subsequent case studies.

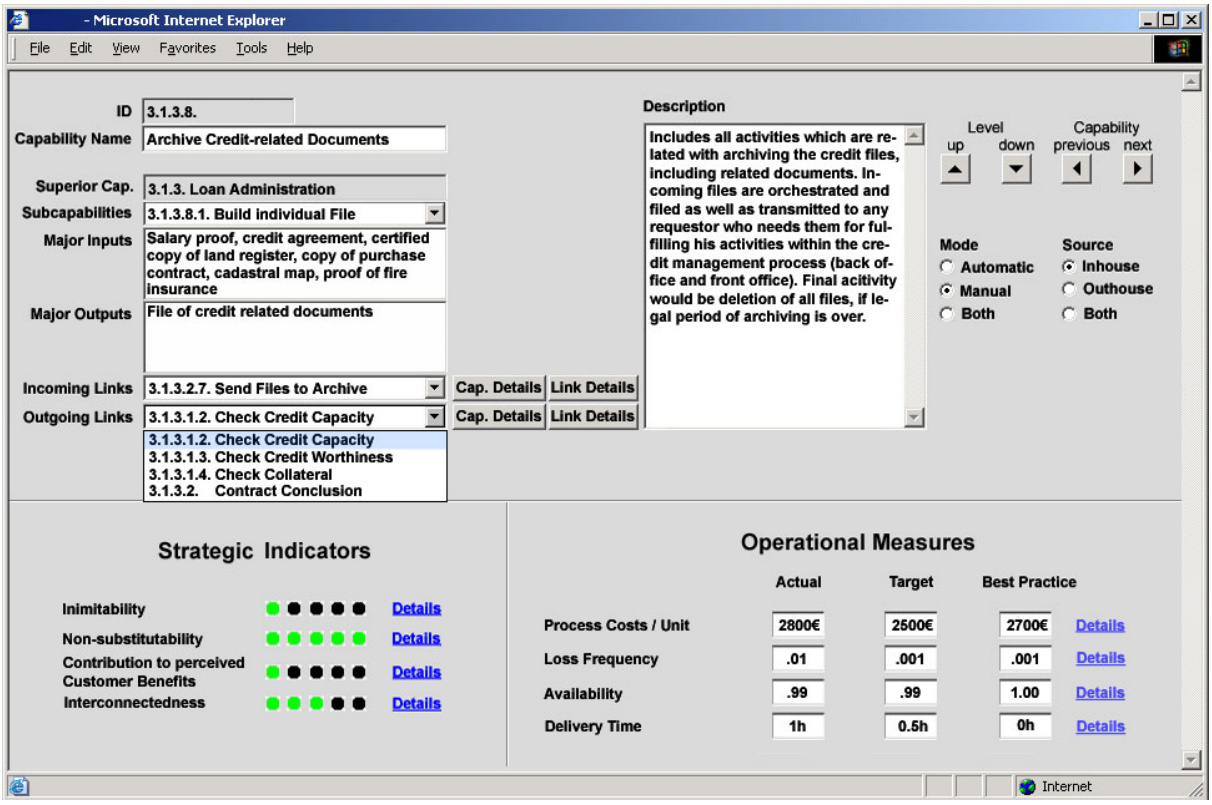

Figure 7: Draft of the Capability Cockpit

This exemplary cockpit GUI consists of four different areas: the upper left area represents basic information about the capability and its relations (description, connections to other capabilities and related inputs and outputs, superior capability, sub-capabilities etc.), while the upper right section provides the navigation through the capability hierarchy and gives information about the implementation (e.g. is the capability operated manually or automatically, inhouse or outhouse?). The lower part contains strategic and operational measures which help to determine the strategic value and the operational performance of the particular capability. The used strategic indicators are deducted from the literature review (section 2.2) and could be supplemented by operational data (depending on the type of the capability and on the level it resides), such as average and worst case cycle times, exception frequencies and/or exception times (if the evaluated capability is sufficiently supported by process-oriented IS, as for example by a transaction system or a workflow management system). Other measures could be activity-based costs or input values, such as assigned working times or similar.

In the following, we want to illustrate a potential application domain in which the CM approach can be used: the strategic instrument of Business Process Outsourcing (BPO). After having completed the CM analysis, ABCD bank took the outsourcing of the "Loan Documents Archiving" capability into consideration, i.e. all operations connected to the documentation of a running mortgage contract (contract, collaterals etc.). After outsourcing, every single document which attains in the bank will be transmitted to the service provider, who orchestrates and archives the loan documentation.

In Figure 7, an exemplary description of the back office capability of archiving the loan documents is provided. As shown there, this capability is not strategic but possesses a lot of connections to other capabilities (visualized in Figure 6). Every time when documents are changed or added to the loan file (for example the collaterals documentation has to be updated continuously for some kinds of loans), some activities within the "Archiving" capability are activated and fed by one of those links. Considering economies of scale, a sourcing provider could execute this capability cost-efficiently (one could imagine that the best-practice values, shown in the cockpit screenshot, are bought in from an analyst) so there would be an opportunity to outsource it. In fact, in Germany, there is already a number of so-called *credit factories* that are able to offer almost every capability which is needed in retail loan processing (BaFin 2003; Krawietz et al. 2003).

Due to the many incoming and outgoing flows that are connected with the *Archiving* capability, these links also have to be analyzed explicitly. There is a lot of physical data interchange from and to the Credit Archiving capability, which would strongly increase data transmission costs if it took place inter-organizationally after outsourcing the archive. Based on that, ABCD bank evaluated which ones of these process flow connectors could be switched from physical to digital transmission. It was found that introducing an electronic archiving system in combination with a workflow management system (both provided by an external company) would be efficient and would diminish most physical data transfer.

Outsourcing a capability does not necessarily change the structure of the capability map. In the case of ABCD bank, the capabilities are still part of ABCD's business, although they are operated externally, and therefore they are still part of the map. The Archiving capability itself changes its character to a virtual capability[2], while the underlying structure (the sub-capabilities) can be removed or replaced by capabilities which only include interaction functionalities, such as "Transmit Documents or Change Requests to Provider" and "Request Documents". Because the provider will scan all documents and make them available elec-

[2] *Virtual capability* means that the capability is not a part of the firm anymore but, still, is a part of the business, where the provider's capability is also a part, now. Therefore, a virtual capability represents an interface to the sourcing provider's executable business functions.

tronically via a Content Management System which allows employees of ABCD to access needed files during management of running loans, the capability of “Request Documents” will only be needed, if e.g. particular collaterals have to be returned to the customer.

Some configurations would have to be changed in the cockpit and, perhaps, several control measures would have to be added to represent the service level agreement between the outsourcer and the insourcer.

4.3 Method Assessment

The concept of capability modeling was designed from the need to get a more steady picture of the firm (compared to existing methods of process and organizational modeling), which enables managers to evaluate consequences of strategic decisions (which affect synchronously processes, data flows and the firm’s size in terms of vertical integration).

As a complementary methodology to existing modeling approaches, it provides an increased level of abstraction of the business model (what the business does) and a raised level of process aggregation (multiple business processes are aggregated to connectors). It is easy to transparently display and to qualify the role that external partners play in ones own business.

A model of capabilities and connections is a much more stable, though not invariable, model of the business. It is stable because it shows what is done. Still, the standardized connections, by whom and how things are done, can be quickly re-wired to realize improvements.

By modeling static structural information (capabilities and connections) and separating it from dynamic information (process), a model is created that uncovers design options not visible through conventional analytic techniques. To our knowledge, it is the first proposition to operationalize insights from the RBV and CBV to provide a business modeling and analysis tool.

Caused by the enormous consolidation and industrialization pressure, (that esp. banks are facing nowadays), a fast switch from a monolithic and rigid process-based view to service orientation, i.e. managing a collection of connected, self-contained business functions resp. capabilities, is needed by practitioners. With service-oriented architectures (SOA), a paradigm supporting this concept on the infrastructure level is already available. The presented approach of capability modeling tries to implement and support this paradigm on the business level.

Criticism on the introduced concept has to be made on the one hand to the capability-based modeling per se and, based on this, on the other hand, to the integration of strategic indicators from literature:

A basic point, which has always to be reviewed when designing hierarchical concepts, is the question if it matches the modeled domain, i.e. should particular capabilities be assigned to more than one superior capability or not? Our experiences while developing the banking capability map in cooperation with partners from the finance industry showed that, of course some capabilities represent bricks of different upper-level capabilities, but the problem could always be solved by deciding either to model the capability multiply within the corresponding upper-level capabilities or, if it is a core function of one particular area, link the other capabilities to it. Therefore, we think that the recommended concept meets the optimal trade-off between complexity and sufficient representation.

Coming to the integration of strategic indicators into the CM concept, the selection and aggregation of different measures could be certainly discussed, as it is frequently addressed in the literature (a good overview is given in (Proff 2004)). It was not our aim to give a sufficient recommendation about which measures should be applied to generic capabilities; we primarily wanted to show the possibilities given by having a capability-oriented analysis tool. The development of strategic measures is part of our further research, but has in any case to

be put on a kind of capability mapping, because assigning measures to capabilities requires a fully realized concept of functional encapsulation to prevent ambiguous measurement.

5 Conclusion and Further Research

The presented paper introduces an approach to a capability-oriented modeling of a firm bridging the gap in operationalizing the RBV. We tried to develop an approach which helps encapsulating and connecting a firm's capabilities to make esp. the RBV and the CBV theories more applicable to practitioners' decision problems. By applying it to the loan process of a bank, it was shown that the approach could be used to model and to analyze a bank's capabilities as well as their interconnections. Furthermore, it was shown how this approach could deliver an added value to existing process analysis methods. Based on a literature review, several strategic indicators were derived and integrated within this approach in order to develop a capability-oriented strategic and theory-based decision support tool.

Shortcomings of our approach were briefly discussed at the end of chapter 4, so in the following we just want to discuss further research. In our next steps we will complete the capability model of a universal bank and redraw the effects that BPO projects of our partners in the banking industry would have had on the capability map. Case-based and process-oriented empirical in-depth research, accompanied with condensing empirical insights from literature, will help to make substantial developments on the strategic indicators for particular areas of the capability map. Unfortunately, a lot of empirical research validating hypothetical relationships between constructs of the RBV or the CBV has often been done only on a very generic level (often on the firm level), making it rather difficult to be applied to particular areas of the banking business.

Furthermore, the capability-based approach will be extended by connecting the business level to the level of information systems infrastructures. Similar to the capabilities structure on the business level, the applications which provide services – demanded by the business capabilities – form a complex system of connected entities, even more when monolithic systems are replaced by service-oriented architectures (SOA). An approach would be to link the capability map to an application map, i.e. to link a capability to its corresponding application or (web) service. This way, managers could much easier capture side effects caused by reengineering actions.

6 References

BaFin "Kreditfabriken – Aufsichtliche Rahmenbedingungen und Anforderungen," Bundesanstalt für Finanzdienstleistungsaufsicht (Federal Financial Supervisory Authority) 2003.

Bahli, B., and Rivard, S. "A Validation of Measures Associated with the Risk Factors in Information Technology Outsourcing," 36th Hawaii International Conference on System Sciences (HICSS-36), IEEE Computer Society, Hawaii, USA, 2003.

Barney, J.B. "Firm resources and sustained competitive advantage," *Journal of Management* (17) 1991, pp 99-120.

BCBS "Operational risk transfer across financial sectors," Risk Management Sub-Group of the Basle Committee on Banking Supervision, Basle, 2003.

Biazzo, S. "Approaches to business process analysis: a review," *Business Process Management Journal* (6:2) 2000, pp 99-112.

Chin, W.W. "The partial least squares approach for structural equation modelling," in: *Modern Methods for Business Research*, G.A. Marcoulides (ed.), Lawrence Erlbaum Associates, Mahwah (NJ), 1998.

Coase, R. "The nature of the firm," *Economica* (4) 1937, pp 386-405.

Coleman, R. "Using modelling in operational risk management," Conference on Operational Risk in Retail Finance Services, London, 2000.
Davenport, T.H., and Short, J.E. "The new industrial engineering: information technology and business process redesign," *Sloan Management Review* (31:4) 1990, pp 11-27.
Day, G.S. "The Capabilities of Market-Driven Organizations," Journal of Marketing (58:4), October 1994, pp 37-52.
Dibbern, J., Goles, T., Hirschheim, R.A., Jayatilaka, B. "Information Systems Outsourcing: a survey and analysis of the literature," *The Data Base for Advances in Information Systems* (35:4) 2004, pp. 6-102.
Dibbern, J., and Heinzl, A. "Outsourcing der Informationsverarbeitung im Mittelstand: Test eines multitheoretischen Kausalmodells," *Wirtschaftsinformatik* (43:4) 2001, pp 339-350.
Eisenhardt, K.M., and Martin, J.A. "Dynamic Capabilities: what are they?," *Strategic Management Journal* (21) 2000, pp 1105-1121.
Grant, R.M. "The resource-based theory of competitive advantage: Implications for strategy formulation," *California Management Review* (33:3) 1991, pp 114-135.
Grant, R.M. "Prospering in Dynamically-competitive Environments: Organizational Capability as Knowledge Integration," Organization Science (7:4), July-August 1996, pp 375-387.
Gunasekaran, A., and Kobu, B. "Modelling and analysis of business process reengineering," *International Journal of Production Research* (40:11) 2002, pp 2521-2546.
Henderson, R., and Cockburn, I. "Measuring Competence? Exploring Firm Effects in Pharmaceutical Research," *Strategic Management Journal* (15) 1994, pp 63-84.
Ittner, C.D. "Activity-based Costing Concepts for Quality Improvement," *European Management Journal* (17:5) 1999, pp 492-500.
Javidan, M. "Core Competence: What Does It mean in Practice?," *Long Range Planning* (31:1) 1998, pp 66-71.
Kettinger, W.J., Teng, J.T.C., and Guha, S. "Business Process Change: A Study of Methodologies, Techniques, and Tools," *MIS Quarterly* (21:1) 1997, pp 55-80.
Knudsen, C. "Theories of the firm, strategic management, and leadership," in: *Resource-based and evolutionary theories of the firm: Towards a synthesis*, C.A. Montgomery (ed.), Kluwer, Boston, Dortrecht, London, 1995, pp. 179-217.
Krabichler, T., and Krauß, I. "Konsolidierung im europäischen Bankenmarkt," ibi – Institut für Bankinformatik und Bankstrategie an der Universität Regensburg, Regensburg, 2003.
Krawietz, P., Lehmann, K., and Druba, S. "Leistungsvergleich der Serviceprovider für Kreditbackoffice-Dienstleistungen in Deutschland," BearingPoint, Frankfurt/Main, 2003.
Mayer, R.J., Painter, M.K., and deWitte, P.S. "IDEF Family of Methods for Concurrent Engineering and Business Re-engineering Applications," Knowledge Based Systems, Inc., 1992.
Moldt, D., and Rodenhagen, J. "Ereignisgesteuerte Prozeßketten und Petrinetze zur Modellierung von Workflows," in: *Visuelle Verhaltensmodellierung verteilter und nebenläufiger Software-Systeme*, H. Giese and S. Philippi (eds.), Bericht Nr. 24/00-I, 8. Workshop des Arbeitskreises "Grundlagen objektorientierter Modellierung" (GROOM) der GI-Fachgruppe 2.1.9 ("Objektorientierte Softwareentwicklung"), Münster, pp. 57-63.
Penrose, E.T. *The theory of the growth of the firm* Oxford University Press, Oxford, 1959.
Peteraf, M.A. "The cornerstones of competitive advantage: A resource-based view," *Strategic Management Journal* (14) 1993, pp 179-191.
Porter, M.E. *Competitive Advantage. Creating and sustaining superior performance*. Free Press, New York, 1985.
Prahalad, C.K., and Hamel, G. "The core competence of the corporation," *Harvard Business Review* (68:3) 1990, pp 79-93.

Proff, H. "A "model of resources refinement" for deriving competence-based competitive advantages and strategies," in: *Resources, Stakeholders and Renewal*, R. Sanchez and A. Heene (eds.), Elsevier, Amsterdam, Lausanne, New York, 2004.

Rasche, C. *Wettbewerbsvorteile durch Kernkompetenzen. Ein ressourcenorientierter Ansatz.* Dt. Universitätsverlag, Wiesbaden, 1994.

Reed, R., and DeFillippi, R. "Casual ambiguity, barrier to imitation and sustainable competitive advantage," *Academy of Management Review* (15:1) 1990, pp 80-102.

Roy, V., and Aubert, B.A. "A resource-based analysis of IT sourcing," 2000s-30, CIRANO, Montréal, 2000.

Salimifard, K., and Wright, M. "Petri net-based modelling of workflow systems: An overview," *European Journal of Operational Research* (134) 2001, pp 664-676.

Wade, M., and Hulland, J. "Review: The resource-based view and information systems research: review, extension, and suggestions for future research," *MIS Quarterly* (28:1) 2004, pp 107-142.

Wernerfelt, B. "A resource-based view of the firm," *Strategic Management Journal* (5) 1984, pp 171-180.

Wilcox King, A., and Zeithaml, C.P. "Competencies and firm performance: examining the causal ambiguity paradox," *Strategic Management Journal* (22) 2001, pp 75-99.

Williamson, O.E. *The Economic Institutions of Capitalism* The Free Press, New York, London, 1985.