Abstract: Business Network Redesign (BNR) has been regarded as the logical step following internal Business Process Redesign (BPR). Several methodological approaches have emerged to support a variety of interorganizational redesign aspects. These either cover the allocation of responsibilities among the actors in a business network or the allocation of activities within an interorganizational business process. This chapter will elaborate on the constitutional elements of BNR methods and use them to analyze existing approaches. An important result is that a holistic methodology that consistently guides the transformation from a business and a technological perspective is still missing. In view of this deficit and the growing adoption of interorganizational IS, this chapter presents a methodology for the implementation of process-oriented portals. An in-depth case study illustrates the transformation of the spare parts business at Watch Corp. Key enabler is a portal that has been integrated with a network consisting of internal departments, external service providers, and suppliers. The application of the BNR methodology at Watch Corp. is shown at the strategy, process, and the systems level. This research concludes with a call for more integrated models across the three architectural layers as well as for an integration of architecture and assessment models.

Keywords: Electronic Commerce, Business Network Redesign, Portal Engineering

From Business Reengineering to Business Network Redesign

Interorganizational relationships and interorganizational information systems (IOS) have been discussed extensively since the 1970s (e.g. (Marrett, 1971), (Stern and Craig, 1971)). However, only now are they about to converge with the internal processes and integrated information systems (IS) that have been designed during the hype of Business Process Redesign (BPR) and Enterprise Resource Planning Systems (ERP) since the mid 1990s. The first reason is that many firms are still in the process of completing their internal reengineering and integration projects. Since external linkages have turned out to be an enormous technological, organizational as well as political challenge most companies were wary of involving additional external partners (Scheer and Habermann, 2000). Second, ERP systems were not originally designed for exchanging information with external partners (Luttighuis and Biemans, 2000). Due to a lack of standardized data and application interfaces as well as mechanisms for securely managing databases which are distributed among many companies, isolated and incompatible IS prevail that require time-consuming manual procedures and entail problems of redundant information. From a business perspective, the consequences are increased inventories and long cycle times. For example, Champy (2002) estimates that total inventories in the value chain system of the worldwide electronics and automotive industries at any given time top $1.3 trillion. Research has shown that information distortion is a main cause of these inefficiencies and that IOS such as electronic data interchange (EDI) are an effective remedy (Machuca and Barajas, 2004).

The convergence of Internet, ERP and IOS technologies enables a powerful information infrastructure that has the potential to generate integrative effects in the interorganizational setting. Although BRR authors have meanwhile enhanced their concepts beyond corporate boundaries (e.g. (Hammer, 2001a), (Champy, 2002)), shaping interorganizational interrelationships by means of information technology (IT) is not new.
Already Venkatraman (1994) conceived the redesign of (external) business networks as a logical next step in the redesign of cross-functional processes inside an organization. Business network redesign (BNR) can not only make processes in existing relationships more efficient, but also change the ‘underlying’ relationships themselves. Ultimately, new allocations of competencies may redefine roles in business networks and create the basis for new sources of competitive advantage (like an enhanced service portfolio or reduced costs and cycle times). This evolution from internal to external redesign has been referred to as the ‘transformation trajectory’ by Venkatraman (1994). Vertical disintegration and increased networking with partners may be observed in many industries. For example, the vertically integrated banking industry is increasingly externalizing processes that were considered as core in the past, such as processing payments or securities (Lammers et al., 2004). Another example comes from the automotive industry, where BMW outsourced the entire development and production of its X3 model to its Austrian supplier Magna Steyr (Edmondson, 2003).

![Fig. 1: Levels of IT-enabled Business Transformation (Venkatraman, 1994, p. 74)](image)

IT acts as an important driver in these transformations. The electronic integration effect described by Malone et al. (1987) makes it possible to link the processes of geographically and institutionally distributed organizational units in much the same way as ERP systems have done in the internal arena. Vendors of packaged software such as SAP or
Oracle are providing interorganizational connectivity by pursuing two directions: First, service-oriented architectures (Papazoglou and Georgakopoulos, 2003) enable machine-to-machine linkages by using standardized interfaces which follow industry norms. In standardizing processes and semantics they go beyond the syntactical EDI standards and promise to lower interorganizational coordination costs as well as the degree of vertical integration (Hagel and Brown, 2001). Since service-oriented architectures are still immature and mainly target high-volume transactions with little variance, the second option for achieving interorganizational linkages are man-to-machine linkages. In this field, portal solutions integrate distributed applications via a common desktop. Portals are helpful in bundling functionalities from internal and external application systems according to various user roles. From a BNR perspective portals are powerful instruments for making information from interorganizational processes available for the participants at little coordination cost (Dias, 2001).

Again, BNR is not primarily technological in nature as the transformation toward networked organizations requires a close alignment of these technologies with strategies and processes. For this purpose, many classical BPR approaches have proposed methodologies which structure and guide the transformation. They decompose the projects into a suitable logic of activities and offer instruments that are useful in conducting the transformation. However, established BPR methodologies are limited in their treatment of the change in roles between business partners and in discovering services that could be offered within a business network. This is the area of BNR which includes all methodological instruments for conceiving and improving business relationships and processes between companies. While BNR is also possible without IT to support it, it is excluded from the present discussion, which is structured as follows: first, established elements from BPR methodologies are combined with BNR-specific requirements to obtain criteria for analyzing existing BNR
methodologies. This chapter describes a methodology that shows how companies may transform their business network on various levels of design using portal solutions.

**Approaches to Business Network Redesign**
As BNR is neither a new field in practice nor in research, a variety of methodologies are available today to address interorganizational redesign issues. The following section first derives redesign and methodological criteria, which are used in a second step to compare established approaches.

**Elements of Redesign Methodologies**
According to Wikipedia (2005) “methodology is the study of the methods involved in some field or endeavor, or in problem solving”. A method comprises a “codified series of steps taken to complete a certain task or to reach a certain objective”. Very often, both terms are used synonymously to define rules, tools and the vocabulary to carry out a certain task. In Software Engineering, for example, “methodology is a codified set of practices (sometimes accompanied by training materials, formal educational programs, worksheets, and diagramming tools) that may be repeatably carried out to produce software”. In BPR, methodologies have proved helpful to systematically address the critical design issues, to leverage experience in prior projects, and to ensure proper documentation for future projects. Comparisons of these methodologies show that although they propose similar steps for proceeding in a BPR project, they differ in their level of detail and the operational project support. As described by Kettinger et al. (1997) and Motwani et al. (1998), we find conceptual frameworks, success stories (‘how we did it’), project manuals and checklists, as well as measurement methodologies such as benchmarking.

Most of these BPR approaches propose activities and a sequence for the redesign procedure which ranges from understanding a problem, to transformation, implementation
and finally evaluation (Motwani et al. 1998). Kettinger et al. (1997) discovered considerable differences regarding the (re)design objects and results that are usually shaped within each activity. For example, organizational forms, metrics, information systems or cultural issues are not explicitly considered in many approaches. Needless to say, the purpose of the various methodologies has to be taken into account. For example, Software Engineering distinguishes ‘thin’ and ‘thick’ methodologies. Whereas the former deliberately avoid high formalization and documentation, only the latter aim at developing a solution following engineering principles. Although each approach has its merits, this chapter concentrates on engineering methodologies, which produce results that are comprehensive, reproducible, and traceable.

In analogy to the natural sciences, engineering approaches such as ‘Business Process Reengineering’ or ‘Business Engineering’ go beyond thin methodologies such as success stories and top-level checklists. They support the staff involved in transformation projects with predefined templates for conducting, elaborating, and documenting the redesign activities. Although creativity and domain specificity call for a methodology’s customization, engineering methodologies extensively structure the complexities of organizational transformation projects. Similar to a toolbox, they offer a broad coverage of the major transformation issues. The goal is to produce unambiguous results using a common language which facilitates the communication between people with heterogeneous backgrounds, an inherent feature in interorganizational relationships. Two established engineering approaches subsequently serve to derive the methodological design elements: Business Engineering for the redesign levels and Method Engineering for the methodological elements.

**Business Engineering.** A key idea of Business Engineering (BE) is to systematically develop a future business solution. It recognizes business processes as the main lever of change, i.e. starting from a future process configuration, the implications are derived for business strategy and the required IS. The way in which this process vision is shaped has to be based on
corporate strategy and has to include the new technological potentials. Therefore, most BE methodologies (e.g. (van Meel and Sol, 1996), (Österle, 1995), (Janssen et al., 2003)) envisage the translation of top-level (strategic) requirements into specific process and systems architectures, thereby achieving an alignment of business and IT (Henderson and Venkatraman, 1999). Since processes are recognized as a separate dimension that connect business strategy and IT, BE methodologies often distinguish the three levels strategy, process, and (information) systems (e.g. (Österle, 1995, p. 25)). For formalization purposes, architectures which map the elements involved and show their interrelationships (Cook, 1996) are defined on each level. Achieving consistency across business, process, and systems architectures is an important goal in BE. Due to criticism regarding the neglect of ‘soft’ issues, which are critical in transformation processes, a change dimension has been added to some BE methodologies, which addresses culture, values, or power bases.

**Method Engineering.** In addition to BE, Method Engineering (ME) is a field that ensures the systematic development of engineering-oriented methodologies (e.g. (Heym and Österle, 1993), (Brinkkemper, 1996)). Following ME, methodologies consist of: (1) A procedure model, which defines the recommended sequence of activities within a transformation project. For example, a BPR methodology may start with a preliminary potential analysis, formulate a scenario of a redesigned process and finally elaborate it in detailed architecture models. (2) Generic templates for these architectures are predefined as result documents. For example, result documents of a BPR methodology are the process architecture showing all processes involved in the redesign effort or activity chains, which detail the sequence of activities within a process. (3) To complete the result documents, techniques propose the necessary steps and provide useful hints. For example, a technique for designing an activity chain would provide guidance regarding the granularity of the steps and on how to derive them from a more general process architecture. (4) Roles describe which members of the organization (e.g. management and/or IT staff) are necessary in the project at a given stage. They are
determined by the decisions that have to be taken and the knowledge required to complete the result documents. (5) Finally, a *meta model* contains an ontology of the main design objects used in the result documents and describes the relationships between these objects. For example, a BPR method would specify that processes produce outputs and consist of various activities.

**Existing Approaches to BNR**

Available BNR methodologies come from diverse disciplines such as production operations management and logistics (e.g. inventory management), marketing (e.g. efficient consumer response), and information management (e.g. EDI, IOS) (Christiaanse and Kumar, 2000). Depending on their origins, the methodologies have been termed ‘interorganizational BPR’ (Clark and Stoddard, 1996), ‘Business Network Redesign’ (Kambil and Short, 1994), ‘Business Network Engineering’ (Franken et al., 2000), ‘Modular Network Design’ (Hoogeweegen et al., 1999), ‘Supply Chain Restructuring’ (Kopczak, 1997), ‘Customer Relationship Re-Engineering’ (Massey et al., 2001), ‘EDI-induced Redesign’ (Sheombar, 1997) or ‘Supply Chain Redesign’ (Handfield and Nichols, 2002). These approaches are heterogeneous in nature and underscore the fact that an accepted methodology for BNR is yet to emerge. The differences are analyzed below with respect to four areas: (1) unit of analysis, (2) scope of redesign, (3) methodological support and (4) assessment criteria. Fig. 3 provides a summary of 17 approaches.

**Unit of Analysis.** Following the emerging theories on IOS, several units of analysis may be distinguished when shaping interorganizational relationships. For example, the model of Gregor and Johnston (2001) consists of an enterprise and an industry-group as well as an external environment perspective. Reimers (2002) goes further and describes four units of analysis: (1) the individual transactions on an operational level, (2) the longer-term business
relationships which include a set of transactions, (3) the focal firm and the supply chain, which covers multiple relationships, as well as (4) entire industries, markets, and economies which include multiple supply chains. Among the BNR approaches two clusters may be observed: institutional approaches which focus on determining the actors within a network and process-oriented approaches which discuss the distribution of activities within a specific process.

Institutional BNR approaches address the distribution of roles between companies and shape organizational forms. The major design elements are the companies involved in business networks, the nature of relationships between these actors, each player’s role and the major services provided within the business network. For example, Short and Venkatraman (1992) describe the implications of Baxter’s ordering system for industry structure. Multiple market-like supplier relationships were redesigned to become longer-term cooperative arrangements. From the methodological perspective, the work of Kambil and Short (1994) goes beyond mapping the actors and the flows of goods. Their ‘roles linkage model’ (upper half in Fig. 2) provides a framework for structuring the coordination mechanisms (‘linkages’) among the various roles in a given industry. To determine the type of linkage, a decision tree based on transaction cost economics is used. Although the ‘roles linkage model’ is useful in mapping relationships and their institutionalization, it does not lead to more detailed specifications on the process and systems level.

By contrast, process-oriented approaches focus on (re)designing the activities and flows between organizations. Most process-oriented approaches visualize how activities are linked by flows of information and physical goods. As Clark and Stoddard (1996) have illustrated, the largest impact on business performance is created when innovations in IT and processes occur in tandem (see also (Clark and Hammond, 1997)). For example, a new process scheme such as continuous replenishment is combined with the introduction of EDI.
Most process-oriented BNR approaches focus on designing information processing (coordination) and physical activities separately. They cover the well-known redesign activities (parallelize, sequence, eliminate, combine) and identify suitable forms of organization (e.g. internal, market, cooperation) (e.g. (Klein and Schad, 1997), (Sheombar, 1997), (Christiaanse and Kumar, 2000)). The lower part of Fig. 2 shows the allocation of activities within a transportation process where an air cargo carrier has integrated the forwarder activities (Hoogeweegen et al., 1999). While contributions from the logistics area mainly focus on redesigning transaction processes, authors from the marketing field choose similar procedures from a customer perspective ((Massey et al., 2001), (Kenyon and Vakola, 2001), (Piccoli et al., 2001)). Here, the contact points to the company, i.e. the individual steps in the customer process, are investigated in respect of possible improvements.

**Fig. 2: Examples for BNR Documentation**

**Scope of Redesign.** A second way to analyze BNR methodologies concerns the scope of redesign. In analogy to classical BPR, radical approaches lead to the formulation of new strategies and gradual approaches to enhanced efficiencies. Christiaanse and Kumar (2000, p. 1086)
observed that the existing literature on process-oriented BNR “takes the existing supply chain as given and attempts to optimize either the material and information flows, or inter-partner relationships in the extant supply chain structures.” Some authors note similar risks in classical BPR, where radical redesign claims are sacrificed for gradual changes (Jarvenpaa and Stoddard, 1998). Since institutional BNR approaches use relationships and networks as their main unit of analysis, changes in this ‘big picture’ (e.g. adding new types of partners) are more likely to have a radical impact than isolated improvements of transactions, which are the domain of the more operational process-oriented approaches. The latter are vital for identifying potentials for efficiency (e.g. eliminating manual re-entry of data) and competitive advantage within a given strategic option shaped by institutional approaches (e.g. creating new services for an activity in the customer process). In this sense Klein and Schad (1997) conceive interorganizational BPR as changes in stable long-term networks with existing partners and BNR as changes in networks that involve new partners.

Both views are not mutually exclusive. Redesign projects often start by developing the ‘big picture’ followed by elaborating a specific or multiple ‘to-be’ scenarios. For example, Hammer (2001b) recommended first selecting ‘high-level’ process candidates (processes with high internal efficiency potentials and a suitable partner), then determining the form of institutionalization (e.g. a joint steering committee) and finishing with traditional redesign and stepwise implementation.

**Methodological support.** A third way to analyze BNR methodologies picks up on the elements of an engineering-oriented methodology. As described in the section above, four redesign levels (strategy, process, systems, change) and five methodology elements (procedure model, techniques, result documents, role and meta model) may be distinguished here. Using these criteria, most of the 17 BNR approaches investigated (see Fig. 3) focus on
one level and neglect the methodological elements. Initial explanations are the narrative nature of some contributions and the focus on quantitative models of others.

The analysis on the redesign level shows an interrelationship with the unit of analysis and highlights the fact that most approaches are limited either to the strategic or the process level. Although many approaches recognize the relevance of IT, they often neglect the formulation of system architectures. Only the approaches of Franken et al. (2000) and Frank (2002) feature an integrated and coherent picture across several levels. These models not only enable the design of strategies, processes, and systems issues but also make it possible to handle interrelationships, such as indicating the implications of a direct sales strategy for the application architecture. Although they are helpful in the documentation of redesign projects, they neither provide an explicit redesign procedure nor metrics for comparing the solutions developed. In addition, predefined scenarios that reduce the effort involved in negotiating a new interorganizational solution with regard to pragmatics, semantics and syntax are not available. Here, a combination with standardization initiatives such as RosettaNet or BPEL (Business Process Execution Language) is required.

Even more heterogeneity may be observed when looking at the methodology elements of the BNR approaches. Only one contribution from the modeling area explicitly mentioned a meta model (Frank, 2002), and only one provided techniques for more detailed guidance during the redesign project (Toncia, 2004). Most authors present a top-level procedure model consisting of four to ten activities (e.g. Hoogeweegen et al., 1999), (van der Vorst and Beulens, 1999), (Piccoli et al., 2001), (Kenyon and Vakola, 2001), (Handfield and Nichols, 2002), (Toncia, 2004)). Result documentation is also a part of many methodologies. However, architecture models which are integrated and consistent across multiple design levels are rare (e.g. Franken et al., 2000), (Frank, 2002), (Toncia, 2004)). Most methodologies use documentation to illustrate exemplary results on the redesign level they emphasize, but they
are not claiming to provide a generalized modeling language. This may also explain why explicit meta models are rare. Other missing elements are role models and techniques. Both deliver operational support in projects and are usually contained in more comprehensive handbooks, which are not available in the BNR area.

**Assessment Criteria.** A fourth way to analyze BNR methodologies relates to how the advantages of a new solution are determined. These criteria may be qualitative or quantitative in nature. Qualitative approaches mainly apply transaction cost theory (e.g. (Klein and Schad, 1997), (Christiaanse and Kumar, 2000)), whereas more quantitative approaches use process measures such as throughput time, process costs or inventory levels (e.g. (Kopczak, 1997), (Hoogeweggen et al., 1999), (van der Vorst and Beulens, 1999)). There is a correlation between institutional BNR approaches and the use of qualitative metrics as well as between process-oriented BNR approaches and quantitative measurements. In view of the unconnected architecture models on the strategy and process level, aligned redesign criteria are still lacking.

In summary, existing BNR approaches paint a heterogeneous picture. The documentation of changes in respect of the business partners involved, their roles and responsibilities, or the activities these actors perform, seems to be the least common denominator. While the IOS literature focuses on institutional BNR, the enhanced BPR approaches concentrate on procedure models for developing lean integrated processes, and the logistics literature on measuring and simulating future process designs. Due to the partial representation of IT issues, new technological developments, such as portals or service-oriented architectures, are not systematically included.
<table>
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<tr>
<th>Redesign approach</th>
<th>Unit of analysis</th>
<th>Scope of redesign</th>
<th>Methodological support</th>
<th>Assess. criteria</th>
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Legend: 0 existing  5 partially existing  ✓ not or only rudimentary existing

Fig. 3: Assessment of BNR Approaches

**Structure of a BNR Method**

The following discussion describes a first step toward a BNR methodology that addresses many of the shortcomings that have been identified above. In view of the broad BNR field, several limitations and requirements were necessary. The methodology should (1) be relevant to practice, (2) cover strategy-oriented redesign of networks as well as efficiency-oriented redesign of processes, and (3) provide broad coverage of redesign levels and methodological
elements (combined as methodological support). Although a list of qualitative and quantitative redesign criteria has been used to assess the ‘to-be’-scenarios, the focus was not on developing mathematical optimization models.

**Research Methods.** To ensure a close link to requirements in practice, a research methodology has been chosen that uses elements from action research (Checkland and Holwell, 1998) and design science (Hevner et al., 2004). The former postulates that the researcher becomes part of the project team and refines his findings in multiple iterations with the team members. The latter explicitly recognizes artifacts such as architectures, methodologies or prototypes as legitimate outcomes of scientific research besides the more theory-oriented behavioral styles used in the natural sciences. For the present research this implied a close collaboration with nine companies during a two-year multilateral project (Alt et al., 2001). The researchers have been involved in bilateral projects with each company, which also comprised designing parts of the solution. The case of Watch Corp. included in the remainder of this chapter describes the activities undertaken in one of these bilateral projects. Experiences from all bilateral projects were generalized and verified in quarterly workshops with representatives from all nine partner companies. This led to the formulation of the BNR methodology for portals described in this chapter.

**Unit of analysis and scope of redesign.** The comparison of BNR methodologies above showed an interrelationship between the unit of analysis and the scope of redesign. Approaches, which focused on the network as unit of analysis also had a strategic scope of redesign. Likewise, process-oriented approaches concentrated on (gradual) redesign within a specific process. In a first step, the criteria unit of analysis and scope of redesign have been combined. A second step established a link to customer-oriented process portals: customer

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1 Partner companies were DaimlerChrysler AG, Deutsche Telekom AG, emagine GmbH, Watch Corp., Hewlett-Packard (Switzerland) AG, Hoffmann-La Roche Ltd., Robert Bosch GmbH, SAP AG, and Triaton GmbH.
orientation was regarded as a main strategic BNR driver and process portals as an efficient means to implement this vision.

Customer orientation is a classical strategic goal for redesign efforts. According to Davenport (1993, p. 270), “processes at the customer interface are perhaps the most critical to an organization’s success.” As described by Treacy and Wiersema (1993) customer intimacy is one strategic option for attaining market leadership alongside product leadership and operational efficiency. Building on these strategies, Hagel and Singer (1999) explained that traditional companies consist of three businesses which, due to their incompatible goals, will lead to an unbundling in the future. The customer relationship business will evolve separately from the product innovation and infrastructure businesses. This chapter only focuses on customer relationship businesses which “seek to offer a customer as many products and services as possible” (Hagel and Singer, 1999, p. 136). Since these offerings are often highly customized, these companies are also referred to as service integrators (Österle, 2001) or orchestrators (Hinterhuber, 2002). Following the literature on customer relationship management (Romano and Fjermestad, 2002), customer business networks generate customer value by closely supporting customer processes.

Portals are important in bundling content from heterogeneous sources to support users who fulfill a certain role. Following Kalakota and Robinson (2001, p. 87) they offer an “aggregated set of services for a specific well-defined group of users.“ For this purpose, standard portal software packages feature navigation, interaction, personalization, security as well as user administration functionalities (e.g. (Dias, 2001), (Davydov, 2001)). Besides popular theme and search portals such as Yahoo! and Google, process portals have emerged as a type of portal which provide support along the business processes of specific user groups (Puschmann and Alt, 2005). Customer process portals bundle services along the entire customer life cycle (CRLC) (e.g. (Piccoli et al., 2001), (Lightner, 2004)) from applications
which are internal as well as external to the company running the portal and provide a single point of contact. Redesigning these processes means obtaining an in-depth understanding of customer problems and creating enhanced customer value via (electronic) services within the process portal (Österle, 2001).

**Methodological support.** Following BE and ME, engineering-oriented methodologies consist of redesign levels and methodological elements. The former structure the relevant redesign issues. On the strategy level, the business network is analyzed in respect of actors and customer segments, as well as the flow of goods and information. On the process level, the front-end and back-end processes are modeled together with the required services. On the systems level, the (technological) portal architecture specifies the internal and external application and integration components. The latter define the building blocks of the methodology. As shown in Fig. 4, the procedure model comprises the three phases business network (BN) strategy, BN processes, and BN architecture. Each contains two techniques, which describe the activities for completing result documents. The case study in the following section will go through each technique and present exemplary result documents.

![Procedure Model of the BNR Method](image_url)
Each technique also comprises a role model, which shows the necessary participants within each organization. As the role models are similarly structured, only an exemplary specification will be included in this chapter (see Fig. 5). On the one hand the general roles within a project are listed (e.g. moderator, decision-maker, supporter) and on the other the roles relating to the portal’s design (portal initiator, pilot partner). The methodology recognizes that pilot partners are important for preparing the successful roll out of a final solution (Czuchry and Yasin, 2003).

<table>
<thead>
<tr>
<th>Roles in General</th>
<th>Portal Initiator (PI)</th>
<th>Portal Partners (PP)</th>
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<tbody>
<tr>
<td>Moderator</td>
<td>Internal or external consultant</td>
<td></td>
</tr>
<tr>
<td>Decision maker</td>
<td>Management representative (marketing&amp;sales)</td>
<td>Management representative</td>
</tr>
<tr>
<td>Responsible person</td>
<td>Managers of marketing, sales, customer service departments</td>
<td>Managers of procurement and other departments involved in portal usage</td>
</tr>
<tr>
<td>Supporter</td>
<td>CIO, representative of IT department</td>
<td>CIO, representative of IT department</td>
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Fig. 5: Roles of ‘T3: Customer Process Analysis and Portal Design’

At last, the meta model depicts the constituent parts of the methodology. Fig. 6 shows the meta model at all redesign levels with its entities and relationships. Since the formal requirements of architectural design are not applicable to the change level, the meta model is limited to the levels strategy, process and systems which will also be discussed in the case study of Watch Corp.
Business Network Redesign at Watch Corp.

As mentioned earlier, the BNR methodology for process portals is based on the close collaboration with nine companies. It reflects the experiences obtained in bilateral projects which were all started from the same methodological foundation, i.e. BE and ME. The following provides an overview of the major activities and result documents that are contained within each phase of the procedure model (see Fig. 4). To understand the case, the first section will introduce the company as well as the main problems prior to BNR.
Company Profile and Initial Situation

Watch Corp. is one of the world’s largest manufacturers of watch movements. The company has more than 15 production sites in Switzerland, Germany, France, Thailand, Malaysia, and China. About 8,000 people are employed worldwide with movements and spare parts being supplied to several internal and external watchmakers (brands). Watch Corp. is a subsidiary of a watchmaking group that comprises a variety of watch brands as well as products in the area of microelectronics, micromechanics and telecommunications. The focus of this case study is the distribution of spare parts from Watch Corp.’s customer service department (WCS) to business customers worldwide. WCS is responsible for the worldwide sales of watch spares, movement repairs and technical customer service. In 1996, it conducted customer interviews and internal process analyses which yielded the following problems:

- As many watch movement components were not only used in one movement ("caliber"), but in an entire caliber family, customers had no information about the interchangeability of (spare) parts. Frequently they lacked up-to-date technical documentation, including exploded diagrams and drawings of individual parts plus service instructions.

- Customers often ordered by describing the required products over the telephone or by fax. WCS then had to find the appropriate part numbers. The consequences were high lead times for orders as well as frequent misunderstandings and incorrect deliveries. Long cycle times were also reported for the repair of watch movements.

- There was no transparency regarding the status of spare parts and repair orders for either customers or WCS staff. In the absence of IT support, article master data were merely recorded in an index card system and even pricing and discounts were neither uniform nor transparent.

When Watch Corp. started its BNR project in 1996, the highest ranked strategic goals were to create a new distribution strategy for spare parts and to install a new distribution channel for
spare parts. Ultimately, WCS was to be positioned as a service center for spare parts that efficiently handles all the needs of a customer within his spare parts business.

**Redesign of BN Strategy**

The strategy level analyzes the relationships of Watch Corp. to its external partners in respect of the process portal vision. As shown in Fig. 7, four areas of relationships may be distinguished: those facing the customer (downstream), relationships with other (internal) departments, supplier-facing relationships (upstream) and those to external service providers. Following the description of the process portal concept above, a single point of access is created for various customer segments that integrates services from internal and external suppliers. In accordance with the present focus on process portals, only these IT-driven improvements are discussed in the following.

**Fig. 7: Business Network of Watch Corp. and BNR Areas**

**Downstream relationships.** Watch Corp.’s business network comprises approximately 1,500 business customers worldwide who include internal and external watch manufacturers (group brands and external brands), wholesalers as well as small dealers (Area 1 in Fig. 7). When the process portal project was started in 2001, the Watch Corp. Online Shop (WOS), an electronic
catalog which went live at the end of 1999, was already in place (Alt et al., 2002). WOS mainly created a direct interaction channel with customers. While customers usually ordered through their country organization or at WCS directly, the WOS enabled them to order at WCS directly. This was the first time that WCS had direct customer relationships that were not intermediated by wholesalers or country organizations. In addition, a direct distribution channel was established together with a centralized high-bay warehouse which eliminated the inventory of country organizations and reduced wholesaler’s stocks to some extent as well. By 2002, approximately 60% of all spare parts transactions were handled via the WOS. However, the WOS mainly covered transaction handling, and activities before as well as after the purchase were not being addressed. In order to shift more transactions to the electronic channel, WCS management decided to design a process portal that would enhance the WOS and establish closer ties to customers. A first rough segmentation distinguished four customer segments: (1) potential customers, i.e. unregistered users, (2) registered component customers, i.e. the dealers worldwide and external watchmakers, (3) other business units within Watch Corp., i.e. production or sales as well as (4) the internal WCS staff. By offering customized services for these customer segments an intensified interaction was to be obtained via the process portal. Thus, the strategy was not primarily to attract new customers, but to strengthen existing relationships and to make them more efficient. The first version of the Watch Corp. Customer Portal (WCP) went live on February 6, 2004 and approximately 70% of the entire parts transaction volume was handled via the electronic channel until late 2004.

**Internal relationships.** Although WCP was conceptualized by WCS, the claim to cover large parts of the user processes called for closer relationships to internal departments, namely marketing, production and sales (Area 2 in Fig. 7). In particular, these departments started their individual IT projects in the late 1990s: marketing has created a master data base of all Watch Corp. products (e.g. article numbers, technical specifications and drawings), production has implemented an ERP system which handles the entire order process for non-
spare parts, and sales is working on a solution for customer relationship management (CRM). As information on products, orders and customer was kept redundant in the WOS to a large extent, regular meetings were initiated with these departments. On the one hand, the portal should enable users from other departments within Watch Corp. to easily access spare parts information and on the other it should integrate information from other departments IS on an automated basis. While a dedicated integration project has been started for the ERP system, the areas of a joint master database for product data and the implementation of a CRM strategy are still in discussion.

**Upstream relationships.** It is in the nature of the spare parts business that demand is in small quantities and unstable across products. Since most parts of watch movements are made in-house, external supplier relationships of the WCS (Area 3 in Fig. 7) are limited to subcontractors for the repair of watches. These relationships were highly intransparent and the repair of expensive watches could take several months. The concept was to use the portal as a repair tracking system as well. For each repair order the elapsed time should be displayed together with the status and the expected date of delivery. These functionalities have already been implemented as a part of WOS in late 2001. Beyond improving these existing relationships, WCS also discussed the opportunity of establishing new relationships to partners whose services would also be relevant to spare parts customers. Examples are providers of complementary products such as batteries, top covers or industry information.

**Service provider relationships.** Services such as logistics, payment or security are considered to be an infrastructure service since they are not specific to certain functional areas (Weill and Vitale, 2002). Similar to intraorganizational infrastructures, the business architecture shows a collaboration infrastructure that clusters all external service providers (Area 4 in Fig. 7). In the past, WCS had relationships to a large number of partners for the physical distribution and one partner for processing credit card payments. While establishing a close (electronic) link to
the payment provider was possible, integrating with over fifty logistics service providers was illusionary. Therefore, it was decided to use an intermediary, which would reduce relationship complexity by providing access to an existing community via one relationship. The logistics broker inet-logistics was chosen who has links to numerous carriers and enables shippers, such as Watch Corp., to concentrate on their core competencies. Modules for order and parcel tracking had already been implemented in WOS in 2001 and were also included in the WCP. Orders could now be tracked during the entire order cycle, including the activities of the various logistics providers.

**Redesign of BN Processes**

From a strategic viewpoint the existing relationships within Watch Corp.’s business network were shifted toward more cooperative arrangements with new relationships being added on the supplier and service provider side. Pursuing the WCP vision was an important driver, which was continued in greater depth on the process level. Two main categories of processes were distinguished: (1) customer processes which relate to the user’s activities at the front-end or the customer interface, and (2) collaborative processes which integrate internal processes and those of suppliers and external service providers (Holstrom et al., 2002). Following the procedure model in Fig. 4, a separate technique was defined for both categories.

**Customer Processes.** Watch Corp. started the customer process analysis in 2001 with a workshop that brought together several representatives from all four customer segments defined on the strategy level. The purpose was to obtain detailed opinions from potential portal users regarding the goals and the services they associated with the portal as well as to understand the work situations that should be supported by the portal. This included:

- The collection of the portal goals and drivers. Each representative was asked to formulate his expectations regarding the portal and to assess potentials and inhibitors. The goals
included projecting a more professional image towards customers, achieving higher process transparency, and the fact that IT operations had to remain inside WCS. So-called portal drivers were used to structure the factors that positively or negatively impact the process portal’s implementation and adoption. The answers were clustered in six categories such as technological, political or project drivers for that purpose.

- The definition of the customer process vision. In a next step a catalog of potential services that could be offered in a process portal were identified. This led to several customer process categories, which are summarized together with the individual services in Fig. 8.

<table>
<thead>
<tr>
<th>Customer process category</th>
<th>Services required by customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technological support</td>
<td>Technological information, inventory and stock policy, support of watch development, technological FAQs, Insert manuals, information on reported problems, complaints management</td>
</tr>
<tr>
<td>Product information</td>
<td>Availability of discontinued movements, new movements in the program, production plans and capacities</td>
</tr>
<tr>
<td>Sales (Order processing/transport)</td>
<td>Interchangeability of parts, parcel tracking, available to promise, order tracking, personalized shopping basket, credit card payment, tool catalog, delivery and payment conditions</td>
</tr>
<tr>
<td>Marketing</td>
<td>Events, industry news, magazines/links, reference list</td>
</tr>
<tr>
<td>Repair</td>
<td>Repair tracking, classification of defects, chat forum</td>
</tr>
<tr>
<td>Financial information</td>
<td>Customer turnover, customer profile</td>
</tr>
<tr>
<td>Company information</td>
<td>Company presentation, contact partner, location, telephone list, addresses, process maps</td>
</tr>
</tbody>
</table>

*Fig. 8: Customer Process Categories and Customer Requirements*

- The documentation of typical customer processes per customer segment. Classical context diagrams that show one process with its process environment (Österle, 1995, p. 79) were enhanced to include the eight to ten most important activities of one customer process. These served to document the operational processes of each customer segment. The typical daily work processes were used to derive the customer process. An example of the customer segment ‘component customer’ is shown in Fig. 9. The graphic can be supplemented by a separate table, which helps to document and prioritize each service in more detail.
• The identification of portal services and categories. Using future customer process categories and the customer process steps, the portal services were identified and grouped in portal categories (see Fig. 9). For the portal categories two design decisions were necessary. The first concerned which customer segment should be authorized to access a certain category and to what extent. For example, potential customers should only access public categories (‘About CS’, ‘Help&Contact’, ‘News&Links’), ‘component customers’ in addition the categories ‘Products&Services’ and internal WCS users all functionalities except ‘Products&Ordering’. The second decision referred to how the categories are linked. One option is a loose collection of links such as the Yahoo! catalog, another is a tight coupling as a workflow. WCS used workflows for ordering procedures which were already defined in the WOS and all other services were implemented as link collections.

![Customer Process Architecture at WCS](image)

**Fig. 9: Customer Process Architecture at WCS**

**Collaborative Processes.** Compared to the redesign of (vertical) customer processes, the ‘Collaboration Process Analysis’ discusses the (horizontal) design of processes across the internal and upstream network. Fig. 10 visualizes the main transaction processes order planning and order execution with an emphasis on the electronic support and the organizational boundary. A large number of IT-supported activities indicate efficient ‘real-
time processes’ and the number of interactions at the interface between WCS and the customers indicates a strong involvement of the customer.

Fig. 10: Collaboration Processes at WCS (partial view)

To identify activities in customer and collaboration processes that may be outsourced to external service providers, Keen and McDonald (2000) suggested the concept of ‘Outtasking’, i.e. small standardized activities performed by external providers that are tightly integrated in the overall process. Watch Corp.’s goal was to keep core activities in-house and to externalize standard services. Services with a high potential for outtasking were those that (1) were not electronically available in-house, but which were required by customers, (2) were already available externally on a time- or transaction-basis, (3) had low resource specificity, and (4) were not strategically relevant. Among the candidates for outtasking within the customer process category were services for article availability, credit card payment, order tracking, industry information and magazines/links. Examples in the collaboration processes included transport planning, parcel label print, transport documentation, preparation of customs data as well as consolidation of order status via multiple transport carriers.

When selecting the providers for services with a high outtasking potential, the external service fees were compared against today’s costs which were calculated from cost center
accounting, personnel costs, the material costs, and the transaction volume. For example, a parcel delivery was not to exceed CHF 30 (USD 23). In addition to cost, criteria such as economic stability of the provider, reference customers, and security levels were evaluated. Today, two external services are used: inet-logistics in the logistics area and Telekurs Card Solutions for credit card and electronic payments. Implementing these partners was not merely a ‘plug and play’ procedure but a joint project effort. Fig. 11 and Fig. 12 indicate significant changes in the collaborative processes with the future activity chain featuring more IT-supported and parallelized activities. Prima vista this implied more complexity since increased interaction occurred between the actors involved and since additional activities were integrated. This is also in line with the shift toward structures with higher coordination intensity as suggested by Malone et al. (1987) which, in the end, has the potential to yield more customer value. In fact, the following benefits were observed at Watch Corp.:

- The electronic catalog reduced article search times per order position by 90% due to unique article identifiers in the order process and the elimination of mapping efforts into Watch Corp.’s internal numbering system.

- The integration of the logistics provider reduced the time to complete transport documents by 10 minutes per document.

- Customer enquiries at the call center, which amounted to an average of 15 minutes per call were reduced due to the available tracking functionalities which substituted most telephone contacts.

- Finally, total order cycle time (time span between order entry and invoice date) was reduced by at least 60%. In view of delivery times of two weeks or more in the past, this turned out to be an important selling proposition for the electronic channel.
Fig. 11: Activity Chain for Order Execution at WCS without Outtasking
Redesign of BN Systems

As outlined above, the first step toward BNR was the implementation of the WOS in 1998. At that time, the decision was taken in favor of a proprietary shop solution since the ‘time to market’ of a packaged and integrated solution was estimated as longer and the initial transaction volumes were estimated as low. Although this solution was enhanced twice (Versions 2 & 3), additional functionalities and external content (e.g. industry information,
events and experiences) were difficult to include. For the design and implementation of a portal-based systems architecture (see Fig. 13), three major steps were taken.

First, the functional requirements for the process portal were derived from the process architecture and used in the evaluation of the portal software and the possible WOS migration paths. The evaluation list initially contained seven software providers. Three of them were short-listed in a preliminary analysis. In the second round, the detailed provider was evaluated jointly by WCS and brand representatives. In addition to the three providers from the first WCS evaluation, the brands put forward another two providers. The best to emerge from the five alternatives was Microsoft’s Commerce Server 2002 as a shop application in combination with the open-source portal application IBuySpy from Microsoft. A Microsoft SQL database contained the portal content and Microsoft Active Directory Services were used for user management.

After the software platform decision, interfaces with both internal systems and with applications from external service providers were designed in a second step. The existing WOS and the different tracking modules were integrated into the WSP and the proprietary WOS (Active Server Pages on Site Server Commerce Edition) being migrated to the MS Commerce server. When implementing the portal application, the front-end design was aligned with corporate identity, and portal services were matched with preconfigured portal modules. During this period members of WCS worked closely with the IT department. After integrating the backend (WOS, tracking systems), the portal implementation was finished within 18 months, and the WSP went live on February 6, 2004. As Version 1.0 comprised only the most important services, such as technical documents, mailings (referred to as ‘CS News’) or price lists, the next steps were to include the services with the next highest priority. The first expansion of WOS V3.0 was completed at the end of July 2004 and covered the

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2 Portal architectures provide an integrated view on presentation, applications/functionality, and data (Puschmann and Alt, 2005).
migration to MS Commerce Server 2002, a graphic redesign and integration into WSP by means of Single Sign On (SSO). The tracking modules, which were still part of the shop, were also migrated to the .NET technology and integrated into WSP as independent portal services.

Third, the expansion phase for the shop started in mid 2004. It focused on the implementation of different language versions, an extended search function for articles, the display of parts availability (Available to Promise, ATP) plus the capability for the customer to select different logistics service providers. In addition, the customer is now able to identify parts on exploded drawings and to transfer them to the shopping cart. At the same time, additional portal services included personalized push information in the form of portlets or e-mail newsletter, Frequently Asked Questions (FAQs) plus a complaints tracking module.

![Systems Architecture at WCS](image)

**Fig. 13: Systems Architecture at WCS**

**Summary and Conclusions**

After redesigning their internal processes, many companies are now targeting the potential in their processes with customers, suppliers, and service providers. Existing BPR methodologies
only support this purpose to a limited degree since neither the institutional redesign, nor the allocation of activities among multiple actors, nor are the implications of portal technologies taken into account. Several authors have recognized these shortcomings and have suggested methodologies for BNR that, depending on the author’s background, are institutional or process-oriented in nature. Although researchers from the field of enterprise modeling or enterprise architectures aim to systematically link strategic and technological design, they often neglect a procedure model and decision-making support, e.g. model assessment in respect of efficiency or strategic recommendations. In order to address these problems this chapter has proposed a methodology that (1) meets the requirements for systematic redesign methodologies, (2) specifically considers the configuration of customer-oriented networks, and (3) introduces the concept of process portals and portal technologies.

This methodology has been developed together with Watch Corp. and a group of other companies. Watch Corp. is a traditional manufacturing company that has been gradually transformed. The process was started with a typical electronic catalog covering only a small part of the customer process. By extending the functionality of the WOS, more activities of the customer process (‘breadth of customer process coverage’) with more functionalities (‘depth of customer process coverage’) were covered. This involved redesign decisions at the strategy, process, and systems levels.

**Strategy Level.** On the strategy level the flows in the business network were improved step by step. First, the downstream flows of goods and information were redesigned with a direct sales and direct distribution solution. This encompassed a change of roles since (1) the customer performs activities, which were previously carried out by WCS (e.g. article search and selection), (2) WCS eliminated warehousing activities in regional and country organizations, and (3) new actors were involved for physical and financial logistics. According to Kumar and Van Dissel (1996), integrators are important in reducing
dependencies in a business network. From this perspective, the logistics service led to an intermediation, which decoupled WCS from the carrier community. In the long run WCS may follow the arguments of Hagel and Singer (1999), who expected the separate customer-oriented companies to emerge. For example, Watch Corp.’s customer service might offer spare parts services to other watch brands or even other industries on the market. Clearly, this vision goes beyond BNR, thus pointing toward business scope redefinition (see Fig. 1).

**Process Level.** On a process level, the development of the process portal strategy encompassed on the one hand the design of customer-oriented processes and the associated portal services (‘front-end perspective’) and on the other hand the processes required for organizing these processes in the partner network (‘back-end perspective’). Based on documentation models from established BPR methods an enhanced form for depicting the customer process and for documenting collaborative processes was proposed. This collaborative process architecture was also used to assess outtasking potentials. Here, established BNR criteria from transaction cost theory have been used such as strategic relevance and resource specificity. However, assessing small activities within processes (e.g. printing barcode labels or consolidating status information from various carriers) also revealed a dilemma of existing BNR approaches: while institutional approaches analyze the roles among companies they lack a comprehensive process analysis, thus making it impossible to know all relevant activities. Process-oriented approaches, for their part, map the relevant processes but neglect the institutional decisions. Since many institutional decisions arise only after the process level has been reached, considering institutional criteria here as well seems one possible solution.

**Systems Level.** Many of the above mentioned concepts have their ‘reality check’ on the systems level. For example, automated processes are invariably associated with homogeneous master data, the availability of services in a digital form, and agreed upon collaborative
processes as well as the interfaces within these processes. Redesign of the systems architecture mainly meant selecting software packages according to functional requirements and embedding the portal in an existing application landscape. WCS decided on proprietary solutions largely because of the lack of economically viable standardized solutions. However, it is clear that standard business applications (e.g. electronic catalogs, portals) as well as standards in the area of collaborative processes can have a positive impact on development and implementation costs.

In summary, the case study shows the role of IT as strategic enabler on the one hand and the non-technical nature of most success factors on the other. This observation refers to internal support for establishing homogeneous master data, responsibilities between marketing and IT for the design and operation of the electronic channel, and the acceptance of supply chain partners and customers. For this purpose, WCS involved pilot partners in the development and formulation of ‘win-win situations’. These situations were elaborated in terms of improved effectiveness (guaranteed delivery times, higher information level, transparent order tracking information, interchangeability information for customers of the EC solution) and higher efficiency (lower order fulfillment costs for Watch Corp. and cost-saving potentials for the brands’ local warehouses).

As described in the initial overview of existing BNR methodologies, research in this area is still at an early stage. This chapter suggests two directions for future research. First, integration on a vertical scale is needed for developing architecture models across multiple layers. It should be possible to easily identify and assess the implications of redesign actions on these levels (e.g. the externalization of an activity to an external service provider or the offering of new services). Promising work is taking place in the field of enterprise modeling and architecting as well as in the standardization field with initiatives from RosettaNet and other industry organizations (e.g. bpmi.org, oasis.org). Beyond conceptual work regarding
meta model, documentation model, role model, and procedure models the development of appropriate modeling tools will also be an important requirement as well. Second, integration on a horizontal scale is needed for linking the architecture models with assessment criteria and simulation facilities. Here, a combination of quantitative and qualitative analyses will be important, since many BNR initiatives are doomed to failure as a result of politics, strategic uncertainties or project complexities.
References


Advances in MIS


