Chapter 8
Process Redesign

We know what we are, but not what we may be.
William Shakespeare (1564–1616)

The thorough analysis of a business process may lead to the identification of a range of issues. For example, bottlenecks slow down the process or the cost of process execution is too high. These issues spark various directions for redesign. The problem is, however, that redesign is often approached as an ad hoc activity. The downside to this is that interesting redesign opportunities may be overlooked. For this reason, it is important to become aware of *redesign methods*, which can be used to systematically generate redesign options.

This chapter deals with the methods that help to rethink and re-organize business processes to make them perform better. We first clarify the motivation for redesign and delve deeper into what improving process performance actually means. Then, we present the spectrum of redesign methods and discuss representative sample methods in some detail. More specifically, we distinguish between transactional and transformational methods.

8.1 The Essence of Process Redesign

In this section, we describe the motivation behind redesign and discuss what lies within the scope of this concept. We will also introduce the Devil's Quadrangle [22], which provides a perspective on the different performance dimensions that are involved in a redesign effort.

M. Dumas et al., *Fundamentals of Business Process Management*,
https://doi.org/10.1007/978-3-662-56509-4_8

8.1.1 Product Versus Process Innovation

Before explaining what redesign is about, let us again consider why it is beneficial to focus on business processes at all. In any firm, innovation can take place along the line of its *products* or its *processes*. *Product innovation* is concerned with the development of new products or the addition of new features to existing ones. For example, think of Apple's introduction of the first iPhone in 2007. In the years following, new generations of this smartphone were developed, each of which included better features than its predecessor. The opportunities to attract new clients and retain existing ones through product innovation, however, are not endless. That is why a second mode of innovation, *process innovation*, has become popular with many firms. In this mode, the focus is on redesigning business processes such that customers are drawn to them to acquire the products or services that they generate. A good example of an organization that heavily relies on process innovation is Amazon. This company continually finds ways to improve its processes. For example, in 2009, it patented the 1-Click ordering technique to simplify the ordering process for its clients. More recently, Amazon introduced robots to improve warehouse operations and drones to speed up its delivery process.

Research has indicated that it is natural for many firms that their initial emphasis on product innovation is at some point followed up by a focus on process innovation [174]. These two successive waves are shown in Figure 8.1. From the curves in the figure, it becomes clear why the innovation of a business process is also referred to as "the second wave of innovation".

Question Can you think of firms or organizations for which product innovation is not an option at all?

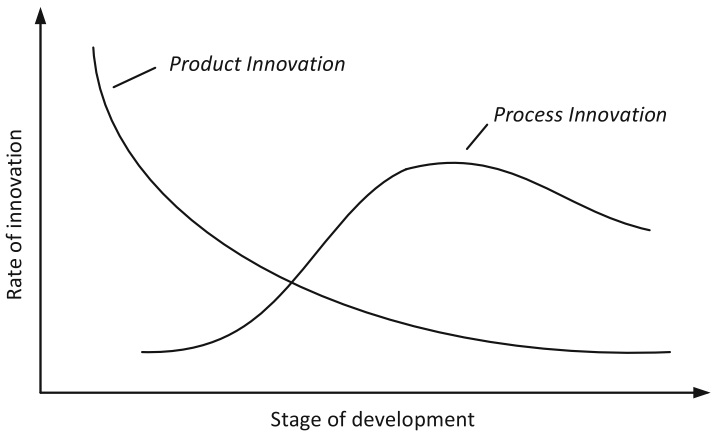

Fig. 8.1 The waves of product and process innovation

An innovation view is one angle to appreciate why organizations wish to improve their business processes. We see this as an *positive* motive, since it takes the noble urge to innovate as a starting point. There is also a less positive, more reactive motivation, which relates to the phenomenon of *organizational entropy*: All business processes evolve over time. As a result, they grow more complex and their performance gradually deteriorates. Consider the following examples:

- A clerk in a warehouse forgets to carry out a quality check for a specific order. The client, who receives the flawed product, becomes upset. To prevent such a situation from happening again, the firm's management decides to add an extra check to the process: A second clerk will verify whether the quality check is properly performed by the first. This is a good fix, but after some time the initial quality check becomes automated through the introduction of a new production system. The check-on-the-check has become superfluous, but is still part of the process. In this way, it keeps on consuming unnecessary resources and time.
- The marketing department of an organization introduces a special campaign. Each time a customer engages with this organization, their account manager asks for extra information beyond what is normally asked. By doing so, the marketing team can make a perfectly customized offer to each customer. Yet, the information comes on top of the information that the customer needs to provide anyway. After some time, the marketing campaign came to an end, but the account managers will still ask for the extra information whenever they interact with the particular kind of customer. It has become an unnecessary and time-consuming step.
- An internal auditing department demands that the monetary value of financial activities should be reported whenever these are carried out. This causes an extra calculation and an extra reporting step in each of the business processes that are affected. Over time, the management of the auditing department changes its priorities and starts looking into other, non-financial information. The reports, nonetheless, keep coming in.

All of the issues mentioned in the three examples can be overcome, of course. The point is that people who are concerned with carrying out day-to-day operations are usually neither inclined nor equipped to start rethinking existing business processes within their organization. Specifically, it is very common that people have a limited insight into why a business process is organized in the way it is: People know how to perform their own work and, perhaps, some of the activities up- and downstream from what they do. But that is about where it ends. Even managers, who are expected to exert a "helicopter view", are normally more concerned with day-to-day execution than structural improvement. People, it seems, are creatures of habit. A business process perspective helps to overcome the inhibition to improve. So, to fight the troubles that go hand in hand with the organical deterioration of a process, redesign is a good weapon.

Exercise 8.1 Can you identify business processes from your own experience that were efficient at some stage, but which have become unnecessarily complex?

While both (1) the positive impetus of organizations to innovate and (2) the phenomenon of organizational entropy show the importance of improving *existing* processes, the principles behind redesign approaches are also helpful to develop *entirely new* business processes. New business processes appear continuously. For example, think of how new legislation may require the development of new business processes. In response to the financial crisis earlier this century, many national governments invoked guardian institutes to watch over banks. The business processes that governed their interaction with the national banks often had to be developed from scratch. Other examples of new business processes can also be clearly seen in healthcare settings, where new medical knowledge triggers entirely new treatment processes. What is important to remember is this: Each business process in existence had to be developed at some stage. Redesign methods can be helpful for new processes, too.

Exercise 8.2 Can you come up with other examples that call for the development of entirely new business processes?

Note that even when new business processes must be developed, we will still refer to such occasions as process *redesign*. Technically, of course, this is a misnomer—it would be more precise to refer to this as process *design*. We will specifically return to the issue of developing processes from scratch when we will be discussing the various types of redesign approaches.

8.1.2 Redesign Concepts

Let us now take a closer look at what process redesign is. If you adopt a very broad interpretation of the term, *any* change to an existing process, be it minor or major, qualifies. Since business processes are complex artifacts with many facets, they concern, among other things, the steps in a process, the workforce that is committed to carrying out the process, the information that is being exchanged, and the information systems employed. So, when we talk about process redesign in the context of this book, we will not refer to minor updates of a business processes, neither to changes of parts that are peripheral to a process, nor to changes that are unrelated to the business process concept whatsoever.

For example, let us suppose that a bank prints the conditions under which a mortgage is granted on ordinary paper. It is also accustomed to sending the paperwork to applicants when the conditions are completely settled and approved. In this setting, we would not consider a change of the company logo on the paperwork as an act of process redesign. If, on the other hand, the client would be provided at any time with an insight into a digital file that shows the conditions as they are developed during the execution of the process, we would be much more confident in calling this process redesign. This would be particularly so if the idea behind it is to improve a customer's satisfaction with the service provided.

Another point that may need clarification is how the terms "redesign" and "innovation" relate to one another. The latter term is used by a number of scholars as special type of process redesign, namely the kind that leads to a groundbreaking shift from how things were done before. We do not follow this distinction exactly and use the terms interchangeably. We do acknowledge that there is a fundamental difference between incremental versus radical methods for process redesign, as we will see later on (see Section 8.1.5).

At this point, we will present a list of elements that helps to think and reason about the most important manifestations of process redesign. These are the following:

1. the internal or external *customers* of the business process,
2. the *business process operation* view, which relates to how a business process is implemented, specifically the number of activities that are identified in the process and the nature of each, and
3. the *business process behavior* view, which relates to the way a business process is executed, specifically the order in which activities are executed and how these are scheduled and assigned for execution,
4. the *organization* and the participants in the business process, captured at two levels: the organization structure (elements: roles, users, groups, departments, etc.), and the organization population (individuals: agents which can have activities assigned for execution and the relationships between them),
5. the *information* that the business process uses or creates,
6. the *technology* the business process uses, and
7. the *external environment* the process is situated in.

With these elements in mind, process redesign can be said to be a substantial and intentional change of a business process. It is primarily concerned with changing the business process itself, covering both its *operational* and *behaviorial* view. Process redesign extends to changes that are on the interplay between the process on the one hand and on the other the *organization* or even the *external environment* that the process operates in, the *information* and *technology* it employs, as well as the products it delivers to its *customers*.

Note that this is still a comprehensive way of looking at process redesign, but it does exclude some activities. For example, out of scope are: the way to train people to optimally perform certain activities, the decision which products to phase out, and the acquisition of a competitor.

Exercise 8.3 Consider the following list and indicate which of these you would consider as process redesign initiatives. Motivate your answer and, if applicable, provide the links to the elements discussed.

1. An airline has seen its profits falling over the past year. It decides to start a marketing campaign among its corporate clients in the hope that it can extend its profitable freight business.
2. A governmental agency notices that it is structurally late to respond to citizens' queries. It decides to assign a manager to oversee this particular process and mandates her to take appropriate counter actions.

3. A video rental company sees that its customer base is evaporating. It decides to switch to the business of promoting and selling electronic services through which clients can see movies online and on-demand.
4. A bank notices internal conflicts between two different departments over the way mortgage applications are dealt with. It decides to analyze the role of the various departments in the way applications are received and handled to come up with a new role structure.
5. A clinic wants to introduce the one-stop-shop concept to improve over the situation that its patients need to make separate appointments for the various diagnostic tests that are part of a procedure for skin cancer screening.

Not each business domain is equally suitable for the application of business process redesign. To appreciate this, consider the differences between industries that deliver physical objects on the one hand and informational products on the other. To deliver a *physical product*, the emphasis is on transforming raw materials into tangible products, which often relies on the use of robots and advanced machinery. For an *informational product*, the emphasis is on the collection, processing, and aggregation of information. Compare, for example, a car manufacturing company with an insurance company as two characteristic examples of the respective domains. In general, it is fair to say that for organizations that primarily deliver informational products the following properties hold:

- Making a copy is easy and cheap. In contrast to making a copy of a product like a car, it is relatively easy to copy a piece of information, especially if the information is in electronic form.
- There are no real limitations with respect to the in-process inventory. Informational products do not require much space and are easy to access, especially if they are stored in a database.
- There are less requirements with respect to the order in which activities are executed: Human resources are flexible in comparison with machines; there are few technical constraints with respect to the layout of the service process.
- Quality is difficult to measure. Criteria to assess the quality of a service, an informational product, are usually less explicit than those in a manufacturing environment.
- Quality of end products may vary. A manufacturer of goods usually has a minimal number of components that any product should incorporate. However, in the services domain it might be attractive to skip certain checks in producing the informational product to reduce the workload.
- Transportation of electronic data is timeless. In a computer network, information travels almost at the speed of light; in a manufacturing environment, the transportation of parts is an essential share of the total cycle time, for example think of parts and sub-assemblies that have to be moved from one plant to the other.

From these differences, it can be concluded that there are more degrees of freedom in redesigning business processes that create informational products than

physical products. To optimize a manufacturing process, one has to look for redesign opportunities while juggling many physical constraints. For example, concrete parts that have to be assembled must be transported to the same geographical location; by contrast, pieces of information can be put together while their digital representation is stored in different locations. Similarly, where logistics has evolved as a field to deal with the inventory of parts and half-products, the storage of (digital) information is usually a matter of the right amount of hardware. Business process redesign, therefore, is easier to apply in the informational domain. In physical environments, this is more difficult, which results in a greater emphasis on the optimization of planning and the management of inventories.

Exercise 8.4 Consider the following business processes and decide whether they are suitable for being redesigned. Use the properties that distinguish the manufacturing and services domain as a mental checklist to support your choice.

1. Dealing with a customer complaint.
2. Carrying out cardiovascular surgery.
3. The production of a wafer stepping machine.
4. Transporting a package.
5. Providing financial advice on composing a portfolio.
6. Designing a train station.

While the opportunities for process redesign differ across domains, it important to signal this trend: Manufacturing and high-tech organizations that used to focus on the production of physical products are increasingly making money with providing informational services along with their physical products. Therefore, for organizations in this domain process redesign is gaining in importance.

8.1.3 The Devil's Quadrangle

So far, we have not been very specific about the goals behind redesign other than that we said that the purpose is to make business process perform better. Since there are, in fact, various directions for improvement, it is time that we should.

Question What do we want to achieve exactly when a process is redesigned?

A framework that is helpful in answering this question is the *Devil's Quadrangle*, which is depicted in Figure 8.2. This framework is based on the four performance dimensions discussed in Chapter 2, namely time, cost, quality, and flexibility. In an ideal world, a business process redesign *decreases* the time required to handle a case, it *lowers* the required cost of executing the process, it *improves* the quality of the service delivered, and it *increases* the resilience of the business process to deal with variation.

The vexing aspect of the Devil's Quadrangle is this: It suggests that improving a process along one dimension may very well weaken its performance along another.

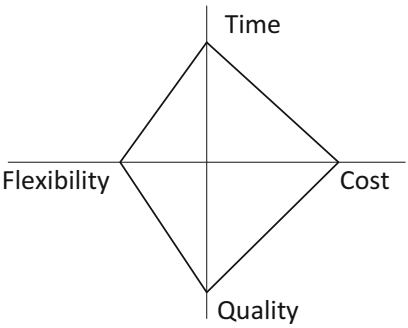

Fig. 8.2 The Devil's Quadrangle

If you were to move one vertex of the quadrangle it may set another one in motion in an undesirable direction. For example, suppose that a process is extended with a reconciliation activity such that the quality of the delivered service is *improved*. This extension may actually *slow down* the delivery time of the service in question, which would be an undesirable side effect. The ominous name of the framework refers to the difficult trade-offs that sometimes have to be made. Awareness of these trade-offs is utterly important to arrive at an effective redesign for a process.

Exercise 8.5 Consider the following redesign acts. Which performance measures are affected by these, either positively or negatively?

1. A new computer application is developed that speeds up the calculation of the maximum loan amount that a given client can be offered.
2. Whenever a quote is needed from a financial provider, a clerk must use a direct messaging system instead of email.
3. By the end of the year, temporary workers are hired and assigned to picking items for fulfilling Christmas orders.
4. A robot carries out part of a surgical procedure, in this way replacing an activity that was previously completely carried out by a surgeon.

While the performance dimensions of the Devil's Quadrangle are helpful to think of the desired effects of business process redesign in general and for a specific business process in particular, they are also useful to think about common approaches to improve business processes. We will devote more attention to this topic when dealing with a specific redesign approach later on, i.e., Heuristic Process Redesign (see Section 8.2.3).

8.1.4 Approaches to Redesign

There is a great variety of books and articles on process redesign. These deal with different methods, present case studies, and suggest management lessons. Since the supply may be a bit overwhelming, the following classification can help us to see

the forest for the trees. There are three levels of abstractions to reason about process redesign: methods, techniques, and tools.

Methods sit at the highest level of abstraction in the redesign landscape; they refer to a collection of problem-solving approaches governed by a set of principles and a common philosophy for solving targeted problems. Specific process redesign methods have been proposed by management gurus, consulting firms, and academic scholars, each with its own emphasis. Methods typically stretch out from the early analysis phase of a redesign project until the implementation of the proposed changes.

At the next, lower level of abstraction, a *technique* is defined as a set of precisely described procedures for achieving a standard task. Some techniques that are often encountered to analyze a business process are, for example, fishbone diagramming, Pareto analysis, and cognitive mapping (see Chapter 6). To support the act of rethinking a process, creativity techniques like brainstorming, SCAMPER, Six Thinking Hats, and Delphi are available. In turn, to model and evaluate business processes, other techniques are in use, such as flowcharting, IDEF3, speech act modeling, activity-based costing, time motion studies, Petri nets, role-playing, and simulation, among many others.

At the lowest, most concrete level, a *tool* is defined as a computer software package to support the execution of one or more techniques. The majority of what some would call *process redesign tools* are in fact merely process modeling tools: They support the use of a notation to capture a business process in a diagram, sometimes in a collaborative fashion. A large number of tools are also available for the evaluation of business process models, in particular supporting the technique of simulation (see Chapter 7). Few tools exist to structurally capture knowledge about the redesign directions or to support creativity techniques.

Our foremost concern in this chapter is with *redesign methods*. A general observation that can be made about these is that they tend to be very specific about the preliminary steps in a process redesign project, e.g., the assembly of the project team, and similarly specific towards the end, e.g., how to evaluate the benefits of a newly implemented business process. They less frequently cover details on *how* to turn an existing process into a better performing one. We will refer to this middle part as the *technical challenge* of process redesign. It is, curiously enough, the most underdeveloped part of many redesign methods, but arguably the most important. After all, the start and end of a redesign project are more often than not simply a matter of good project management. Alec Sharp and Patrick McDermott made a witty observation on this phenomenon:

> How to get from the as-is to the to-be [in a process redesign project] isn't explained, so we conclude that during the break, the famous *ATAMO procedure* is invoked ("And Then, A Miracle Occurs").

Our aim with the remaining part of this chapter is to focus on methods that provide concrete guidance for the technical challenge of process redesign. Before we embark on the explanation of a number of these, we need to take a look at the factors that distinguish them from each other.

8.1.5 The Redesign Orbit

We can distinguish a whole spectrum of business process redesign methods. We visualized this spectrum as the *Redesign Orbit* in Figure 8.3. The vertical axis distinguishes the *transactional methods* that are positioned on the left-hand side of the figure, such as Six Sigma, from the *transformational methods* on the right-hand side, such as NESTT. Similarly, the horizontal axis in the Redesign Orbit shows the distinction between the *creative methods* like 7FE at the top side of the figure and the *analytical methods* like Business Process Reengineering, which are below the vertical axis. The inner circle of the Redesign Orbit contains the methods that can be characterized as *inward-looking*, while the methods outside this circle are *outward-looking* in nature. An example of the former is, again, 7FE, while an example of the latter would be Lean. The three respective axes in this Redesign Orbit concern the *ambition* behind the method, the *nature* of the techniques it embodies, and the *perspective* it assumes on the business process. We will now explain these in more detail.

The *ambition* behind a redesign method refers to the magnitude of the change that it seeks to bring about. We distinguish between transactional and transformational methods. A *transactional method* supports the identification of problems or bottlenecks in a process and then helps to resolve these in an incremental way. As such, a transactional method does not challenge the foundations of the existing process, but seeks to improve the overall process gradually. A *transformational method* aims to achieve a breakthrough: change on a grand scale. This type of method disputes the fundamental assumptions and principles behind an existing process and aims to radically break away from these. The distinction between transactional and

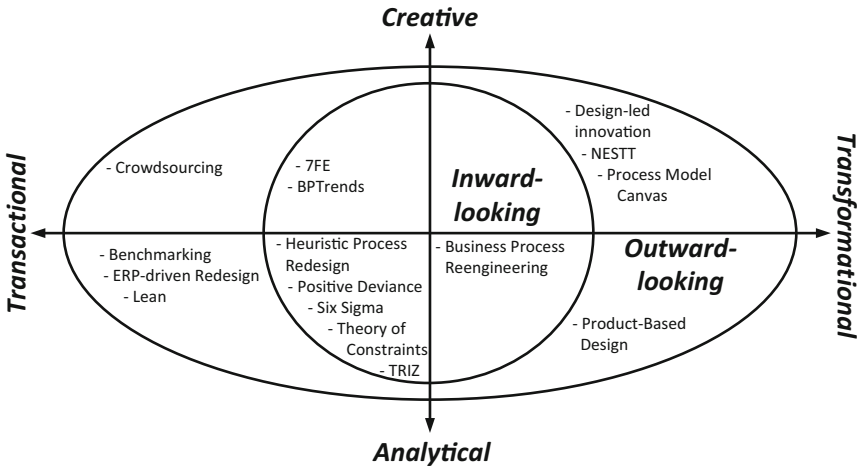

Fig. 8.3 The Redesign Orbit: A spectrum of business process redesign methods

transformational redesign methods can also be framed as the difference between *evolutionary* and *revolutionary* approaches to process redesign.

Redesign methods also differ with respect to their *nature*, with analytical and creative methods as antipoles. An *analytical redesign method* is characterized by a mathematical basis and the use of quantitative techniques. This type of method is also likely to employ tools to support its various stages, in particular to analyze process deficiencies or to generate process alternatives. By contrast, a *creative redesign method* embraces human creativity and ingenuity. It often builds on the advantages that are gained through the phenomenon of *group dynamics*: People stimulate each other to come up with new ideas on how to organize a business process, typically within the setting of a workshop.

A final differentiating factor is the *perspective* that is being taken by the redesign method. An *inward-looking redesign method* assumes the viewpoint of the organization that hosts the business process. With such a method, the concerns and interests of that organization itself take center stage. The information that is gathered about the process also often comes from within the organization itself. Its obvious counterpart is an *outward-looking redesign method*. Such a method takes an outsider's perspective on the process, very often that of the customer or even a third party. In addition, an outward-looking method is typically driven by opportunities and developments that are taking place outside the organization that is redesigning.

It is important to note that the choices along the axes we discussed here are orthogonal. A method, for example, could be transactional, creative, as well as inward-looking; see 7FE in Figure 8.3. Another thing to note is that some of the methods have evolved from others. For example, Heuristic Process Redesign is a method that has been derived from core ideas behind Business Process Reengineering and Lean.

Exercise 8.6 It could be argued that Total Quality Management is a redesign method in its own right (see the "Related Disciplines" box in Chapter 1 on page 7). How would you position this method in the Redesign Orbit with respect to its ambition?

The remainder of this chapter will focus on describing the various redesign methods as included in the Redesign Orbit. We will first discuss the transactional methods and then follow up with the transformational methods.

8.2 Transactional Methods

We will briefly characterize the various transactional methods that exist. Specifically, we will deal with the ones mentioned in Figure 8.3. After this walkthrough, we will discuss two methods in considerable more detail: 7FE and Heuristic Process Redesign.

8.2.1 Overview of Transactional Methods

The transactional part of the Redesign Orbit can be further broken down using the *nature* axis, which distinguishes between creative and analytical methods. Probably the most well-known example of an *analytical* method in this setting is *Six Sigma*, which we encountered before (see the "Related Disciplines" box in Chapter 1 and "Further Readings" in Chapter 6). The core idea behind Six Sigma is that a number of process performance measures is closely monitored for deviations of a norm or target value. Such measures typically relate to resource consumption, cost, cycle time, or customer satisfaction. The goal is to bring back any deviations to a very small fraction in proportion to the desired outcomes.[1] Six Sigma consists of a large collection of techniques to specify measures, quantitatively analyze deviations, and determine the causes for detected deviations. It emphasizes the use of statistical tools to determine the size of deviations. In this way, Six Sigma is rather more focused on the identification and justification of process improvement opportunities than on the generation of concrete redesign measures itself.

Another well-known analytical method is associated with the *Theory of Constraints* (TOC). The TOC holds that any production system is limited in reaching its goals by at least one constraint. For instance, in Section 7.1.5, we identified the cook as the bottleneck in the restaurant. The idea is, therefore, to focus on lifting that constraint to improve the productivity of the overall system. If successful, performance will improve yet another constraint will manifest itself. So, the steps of identifying and lifting a constraint need to be repeated. As such, the TOC puts much emphasis on process improvement as an ongoing process. Examples of constraints that may be relevant in a particular business process context are: the equipment or infrastructure that is available, the skills of the people involved in the process, and the policies that govern the execution of the process. The TOC embraces a set of tools that help project team members to converge on their assessment of performance problems and solutions for these, with much emphasis on the logical connections between the outcomes of these different tools as a basis for validation and decision-making.

Relatively unknown outside East Europe is *TRIZ*, which emerged as a generic theory of problem solving. Its creator, Genrich Altshuller, studied more than 40,000 patents to find out how product innovations take place. His main insight was that innovations follow up on each other through an evolution of *patterns*. For example, one such pattern is that if the possibilities are exhausted to further significantly improve a technical system, then the next step is that it will be included in a super-system, as a part of it. Various researchers have picked up the TRIZ patterns to try and translate them to the improvement of socio-technical systems, services, and, in particular, business processes. REPRO is a good example of a contemporary redesign method that encapsulates various TRIZ principles for the specific purpose

[1] The "sigma" (σ) refers to the common symbol used in statistics for a standard deviation, which quantifies the amount of variation.

of generating evolutionary improvements of existing processes [183]. One of its patterns is to let employees generate feedback at any given point in a process, while another pattern concerns the introduction of short-cuts through a process. Methods that are based on TRIZ all share the analytical component of using a set of explicit principles to generate redesign options.

A rather different approach to process redesign aims at the identification and utilization of deviant behavior within organizational contexts. The assumption is that individuals or groups sometimes intentionally behave differently than what is considered the norm, yet with remarkable positive effects. Such *Positive Deviance* can be used as a blueprint for spreading that behavior, hopefully with similarly positive effects. It was established, for example, that in the setting of bakery trading departments in a large retail organization some of these strategically minimized the offer at the end of the day in order to minimize waste, while this was against company policy [114]. A Positive Deviance approach may build on either qualitative (interviews and observations) or quantitative techniques (statistics). What is crucial is that a reliable link is established between the intent, the actual behavior, and the desired outcome. So, similarly to Six Sigma, it is important to precisely define relevant measures and establish the links between these.

Six Sigma, TOC, TRIZ, and Positive Deviance methods all have in common that they strongly focus on the existing process in an organization as a starting point. This is a clear indication of an *inward-looking* perspective. This also holds for Heuristic Process Redesign, which we will be discussing in more detail in Section 8.2.3. Of course, to some extent all the methods mentioned take into account some influences from the external environment. Yet, other methods are *fundamentally* outward-looking. We will now discuss Benchmarking, ERP-driven Redesign, and Lean, which all assume a fundamental outward-looking perspective.

Benchmarking in the context of BPM is a collective term for a range of approaches. All of these aim to compare competing designs for a particular process and to enable a choice between these according to the criteria that are most relevant for a firm. In principle, organizations can carry out a benchmarking study themselves. A case in point is the Dutch CoSeLoG project, which pitted together five Dutch municipalities that wished to compare their business processes with respect to their design and performance.[2] It is more common that the comparison is done by a consultancy company, IT solution provider or standardization consortium, which then develops *standardized* versions of business processes for a particular industry. These standardized processes are then presented as *blueprints*, *best practices*, *industry prints*, or *reference models*. Examples are the Information Technology Infrastructure Library (ITIL) for IT service management and the Supply-Chain Operations Reference model (SCOR) for supply chain management (previously mentioned in Chapter 2). The attraction of such standardized processes for individual firms is that they may decrease the efforts to develop new processes or to change existing ones, while there is also the suggestion that the pre-packaged

[2] http://www.win.tue.nl/coselog/wiki.

process designs are in some sense superior to what individual firms can come up with. Since these designs represent to some extent how an industry is taking care of certain crucial processes, they are rather conventional in their set-up. This also explains why a benchmarking approach should be considered as *transactional* in nature.

A specific variation of the benchmarking approach is one where a process redesign effort is *driven by an enterprise IT system*. Such a system supposes that important business processes take on a particular form. This is, in more specific terms, the case when an organization starts the implementation of an ERP system, such as SAP, Oracle ERP, or Microsoft Dynamics ERP. An ERP system is a standardized software system, based on an integrated database, which consists of several modules that support specific business functions, such as purchasing, finance, and human resource management. The key insight for process redesign is that the logic underpinning the modules of an ERP system already suppose to quite an extent how the business processes they aim to support are organized. This logic is often grounded in the vendor's conception of how business processes in certain industries are typically organized. This implies that organizations adopting an ERP system in fact also accept the vendor's view of how certain business processes should be organized. This is the link to the benchmarking approach we just discussed. As to the flexibility that firms have to adapt ERP systems to their specific preferences, notable progress is being made through making such systems more "process-aware" (see Chapter 10 for a discussion on this concept). It still seems fair to say that the majority of efforts that an organization needs to make to implement an ERP system relate to the alignment of that system's functionalities and the characteristics of the organization itself.

The last analytical redesign method that is left to be discussed on the transactional side of the Redesign Orbit is *Lean*. We already briefly touched on this philosophy in our "Related Disciplines" box in Chapter 1 on page 7. Lean is concerned with improving business activities (1) on the overall enterprise level as well as (2) on the more operational business process level. The main tool for the former is value-stream mapping, which aims at capturing an entire value chain. This is highly similar to the end-to-end process concept that we saw before in Chapter 2. A core Lean guideline is that such a value stream must show how value is generated from the perspective of a customer. Mapping value streams serves the purpose of identifying dependencies between processes and, if possible, shaping them into so-called Just-In-Time dependencies. It diminishes inventories when raw materials or sub-assemblies are handed over from one process to the other in such a fashion. On the operational business process level, Lean's main emphasis is on the elimination of waste (see Section 6.2). In a Lean initiative, individual process activities are assessed on whether they add value or do not, once again considering the perspective of the customer. In fact, the customers' interests are so central in the Lean philosophy that "the voice of the customer" (VOC) has become a standing term. This also explains that we consider the overall method as outward-looking. It should also be noted that Lean principles to improve processes are often used in succession to the process

assessment activities of Six Sigma, even to the extent that this has evolved into the overarching *Lean Six Sigma* method.

We now turn our attention to the *creative* counterparts of the transactional methods that we discussed so far. We have seen that methods like Six Sigma, TRIZ, and benchmarking employ all kinds of tools, involve statistics, and are strongly rationalized in that they aggregate information collected within an entire industry. Compared to this analytical angle, the more conventional approach to process redesign for many organizations is to unleash the creativity of people. This in particular relates to the people who are already working within the setting of internal business processes or otherwise hold deep knowledge of such processes. In Figure 8.3, we included two methods that are representative for a wide variety of such methods: *7FE* and *BPTrends*. These involve similar steps and a similar logic to redesign processes. Essentially, they aim to bring together people with knowledge of an existing business process during a series of workshops. Typically, such people represent the various business functions and roles that are relevant in a particular business context. Under the guidance of a professional facilitator, workshop participants identify process weaknesses, question the assumptions underlying the process, and then generate ideas to change aspects of that process for the better. To stimulate people to come up with ideas, creativity techniques such as brainstorming, SCAMPER, and group ideation are applied. Workshop participants may scribble down ideas on Post-it notes, which can then be visualized to all participants on whiteboards, shuffled around to identify synergies or similarities with other ideas, or put aside if they do not find sufficient support. All major consultancy companies have developed their own proprietary versions of this type of redesign method, which they offer to their clients, along with the facilitators that are versed in applying these. To get a more profound understanding of this type of method, we will be looking at the different steps of 7FE in more detail in Section 8.2.2.

Both 7FE and BPTrends are distinctly inward-looking with their emphasis on engaging professionals that already play a role within a targeted business process. Interestingly, through the advent of *crowdsourcing* and *open innovation*, it has become feasible for firms to more easily than before tap into the skills and knowledge of people outside their organizational borders. This may affect how process redesign is taking place, even to the extent that this at some point may lead to an *outward-looking* variant of a transactional, creative redesign method. While no full-fledged methods in this sphere yet exist, it can be imagined how crowds of customers or suppliers may help to identify process weaknesses and generate improvement ideas. Experiments in healthcare settings, for example, have already identified the potential of soliciting the ideas of patients to improve the non-clinical parts of treatments. Also, airlines actively scan social media to identify structural performance issues. Of course, it is likely that the mobilization of external knowledge and viewpoints will need to be combined with internal efforts to change any process for the better. That such people-centered methods will shift the attention from the internal perspective to that of outsiders still makes them distinctly *outward-looking*.

Exercise 8.7 Are you familiar with a transactional redesign method that is not included in the Orbit? If so, what other method does it resemble most?

This ends our discussion of the characteristics of the transactional redesign methods within the Redesign Orbit. As announced, we will now be looking at two transactional redesign methods in more detail.

8.2.2 7FE

Jeston and Nelis' *7FE* is essentially a framework for BPM projects or even BPM programs, which involve multiple BPM projects. The 7FE framework[3] consists of a number of phases to bring a BPM project to a successful end. This ranges all the way from the formulation of the organization strategy at the start, through phases that involve the composition of the project team and an analysis of the current situation, towards the redesign of a process and its final implementation. In this sense, 7FE is considerably more extensive than what we refer to in this chapter as a redesign method. Nonetheless, the specific *Innovate* phase of 7FE covers what we referred to as the *technical challenge* of process redesign. 7FE explicitly underpins this phase by the view that workshops are the best way to develop new process options and alternatives, which puts it in the *creative* sphere of the Redesign Orbit. It is this part of the framework that we will focus on now.

There are roughly three stages that can be distinguished in the 7FE process redesign method:

1. *Prepare*: In this stage, all necessary inputs for the workshops are collected. Specifically, it needs to be clarified (a) how the redesign project and the new process link with the organizational strategy, (b) what the goals are for the process as well as the associated performance measures, (c) what constraints are placed on the redesign options, and (d) what the desired timeframe is for the redesigned process to get implemented. With respect to creating an understanding of the position of the business process in its organizational context it makes sense to consult the process architecture (see Chapter 2). From the perspective of managing stakeholder expectations, it is also wise to gather information from external stakeholders on how they would preferably like to interact with the process in future. Finally, it may also make sense to make an inventory of state-of-the-art technologies that may be relevant for automating (parts of) the business process in question.
2. *Generate*: During the actual workshops, the emphasis is on the generation of ideas for a redesign of the business process in focus. 7FE insists on the incorporation of an external, independent facilitator to lead these workshops. In this way, it is expected that a neutral, "baggage-free" view on the process is maintained. The other participants should be recruited from those who have an intimate knowledge of the process. If the time frame for the redesign extends

[3]The name is derived from four foundational concepts for this framework that start with an F and three that start with an E: seven in total.

across 24 months, it is also important to include senior executives that can make decisions about strategic issues. The character of this stage is to first generate a range of ideas, after which convergence and consensus is pursued. Preferably, this leads to one or more scenarios for an improved process.

3. *Validate*: Once the scenarios have been determined, it becomes important to test these on their effectiveness and feasibility. In 7FE, the preferred technique to assess these elements is the use of simulation (see Chapter 7). The most attractive of the generated scenarios should then be further assessed to determine whether they meet all stakeholder needs. Once again, this is an activity that can be carried out in a workshop setting. At this stage, it becomes relevant to include participants with expertise in compliance, IT, operational risks, and auditing, such that it can be determined whether the redesign accommodates concerns from these areas as well. A final technique to assess the quality of a redesign scenario, especially one that relies on automation, is to develop a prototype of the process. An alternative is to carry out virtual walkthroughs of the intended, new process. The redesign effort ends with documenting the process, the motivation behind it, and the results of the various evaluation actions.

We will now focus the presentation of 7FE on the various techniques that are proposed to stimulate workshop participants in the creation of redesign options, which is situated in the *Generate* stage that we just described. They relate to facilitation, the customer perspective, and triggers.

The *facilitator* has a special role in the execution of the workshop and is to a large extent responsible for creating the right climate for the generation of ideas. The first objective for the facilitator is to prevent any judgment from workshop participants during the initial part of the *Generate* stage. Only in a further phase it becomes important to start filtering out ideas that are infeasible or impractical. Jeston and Nelis specifically recommend the facilitator to:

- Ask lots of "what if" and "why this" questions,
- Not accept what he is or she is told (the first time),
- Look for the second 'right' answer,
- Regularly change the question and come it at from a different direction,
- Challenge the rules of the process,
- Rely on intuition.

Exercise 8.8 The specific recommendations that are mentioned here strongly resemble those of a group creativity technique called *brainstorming*. While this approach is quite popular in industry for problem-solving, it has its drawbacks too. Can you think of any?

From the list, it becomes clear that a facilitator needs to rely on vast experience to successfully apply these principles.

7FE suggests that a good way for getting workshop participants in the mood to generate ideas is to have them model the process to be redesigned from a *customer's perspective*. In other words, they should identify when customers interact with the process, how the interaction takes place, what the information is that is being

exchanged, etc. This may be quite a different perspective from what the workshop participants are accustomed to when thinking about a process. After all, a customer is often not interested in what exactly goes on within an organization, while process participants do carry out different steps that do not involve direct contact with the client. Looking at the process through a customer's eyes may enable workshop participants to identify flaws or inefficiencies within the business process that they would otherwise overlook. Additional to this exercise, it may also be useful to compare what a costumer would experience when interacting with a competitor of the organization that the workshop participants work for.

The recommendation to take a customer's perspective on a business process is highly related to the identification of the *customer journey*. This has become one of the most widely used tools in service design, where it also includes the feelings, motivations, and issues that customers may have about the so-called *touch points* with an organization. It is clear that these latter types of information may not always be directly available in the setting of a 7FE workshop, although this may be information that could be collected up front, e.g., through customer surveys.

Another similarity that comes to mind in this context is that of the *mystery shopper*. This is a technique used in market research where a specifically hired professional performs tasks such as purchasing a product, asking questions, registering complaints, or behaving in a certain way to collect insights in how an establishment performs. That a walkthrough of a process is useful for the purpose of understanding its inefficiencies will also become apparent in Exercise 8.15 (page 333).

Another way to stimulate the stream of ideas is to guide participants to *problematic elements* of a business process as well as *generic solutions* that may be applicable for the business process under consideration. In 7FE, both problems and solutions can be used as *triggers* for generating a better process design.

An example of a typical *problem* that could be used as a trigger is the concept of *handoffs*. These concern the points where transfers of cases take place from one organizational unit or role to the other. At handoffs, the tension is the strongest between the traditional, functional orientation of an organization and a horizontal, process-oriented view on it. After all, the goals of the independent departments themselves may not be conducive to properly coordinating the work between those departments. For instance, in many organizations people from the sales department close a deal, which needs to be registered and fulfilled by people from other departments. It then makes sense to investigate how much time it takes before information on the closed deal is picked up by the other process participants. If this consumes too much time, this can be a specific issue that may trigger improvements to the overall process. For this example specifically, workshop participants could then propose that the transfer of information from a sales rep to an administrative clerk be improved by integrating the IT systems of the separate departments.

An example of a trigger in the form of a *generic solution* is to let workshop participants consider the use of a particular technology, such as RFID (Radio Frequency Identification) technology. RFID allows for an economically more reasonable way of tracking the whereabouts of important physical elements in a business process than many older approaches. RFID may be useful if inefficiencies

of the process seem related to items getting lost and considerable effort is needed to locate them again. Also, this type of technology may help to provide customers or suppliers with more accurate information on the progress of the work that is relevant to them. In 7FE, a range of other examples of generic solutions are mentioned. They are, in fact, to a large extent similar to some of the redesign heuristics that form the core of the redesign method we will be looking at next: Heuristic Process Redesign.

8.2.3 Heuristic Process Redesign

In contrast to 7FE, the use of workshops is not an important ingredient for the *Heuristic Process Redesign* method. Rather, the emphasis is on the systematic consideration of a wide range of redesign principles, which makes it an *analytical* instead of a *creative* approach. These *redesign heuristics* are similar in nature to some of the triggers we have seen in 7FE. However, their number is much larger than the principles that can be found within 7FE and comparable redesign methods. This wide range of heuristics is, in fact, where the strength of Heuristic Process Redesign lies.

For the explanation of Heuristic Process Redesign, we will again focus on the *technical challenge* of generating a new process design. We will also provide pointers to other parts of the book here. First, we will outline the stages and then turn to its most important ingredient in more detail, i.e., the redesign heuristics that are important to the *Design* stage.

1. *Initiate*: In the first stage, the redesign project is set up. There are various organizational measures that have to be taken, e.g., setting up the project team, but from a technical perspective the most important goals are: (a) to create an understanding of the existing situation and (b) to set the performance goals for the redesign project. For (a), the modeling techniques that have been discussed in Chapters 3 and 4 are useful, as well as the analysis techniques explained in Chapters 6 and 7 to gain an understanding of performance issues, bottlenecks, and improvement opportunities. To arrive at a clearer picture for (b), the Devil's Quadrangle that has been discussed in this chapter is a great asset.
2. *Design*: Given the outcomes of the initiate stage, the design stage makes use of a fixed list of redesign heuristics to determine potential improvement actions on the existing process. For each of the performance goals, there needs to be a reflection by the project team on relevant heuristics that may be applied. A redesign heuristic is desirable to apply if it helps to attain the desired performance improvement of the process under consideration. After it has been determined which redesign heuristics may be helpful, it makes sense to see whether clusters of these can be formed. For some of the heuristics it may make sense to be applied together, for others this is not the case. For example, if you decide to automate a certain activity, it makes no sense to empower the resource that initially carried out that activity. On basis of relevant clusters, a set of scenarios can be generated,

each of which describes which redesign heuristics are applied in this scenario and, importantly, how this is done. For example, if the heuristic to automate an activity is applied it needs to be specified which activities are subjected to it. The scenarios, therefore, should be seen as *alternatives* for the process redesign.

3. *Evaluate*: This is the stage where the different redesign scenarios as developed in the previous stage need to be evaluated. This evaluation can be done in a qualitative way, e.g., employing the techniques from Chapter 6, or in a quantitative way, see Chapter 7. In many practical settings, a combination of the two is used where a panel of experts assesses the attractiveness of the various scenarios and where simulation studies are used to underpin the choice for one particular scenario to be developed further, potentially all the way to implementing it. An outcome of the evaluation stage may also be that none of the scenarios are attractive to pursue or are seen as powerful enough to establish the desirable performance improvement. Depending on the exact outcome, the decision may be to adjust the performance goals, to step back to the design stage, or to drop the redesign project altogether.

The description of the stages are here described as separate ones, but in practice they will be executed in highly iterative and overlapping ways.

We will now focus the discussion of the Heuristic Process Redesign method on how to employ heuristics during the *design* stage.

Redesign Heuristics

The main component of the design stage is the methodological evaluation of a set of *redesign heuristics*. Redesign heuristics can be seen as rules of thumb for deriving a different process from an existing one. The full set we consider in this book consists of 29 redesign heuristics, which can be found in Appendix A. All heuristics are based on historic redesign projects, where they were applied successfully to generate redesign scenarios. The reader who is interested in the derivation of this set is referred to [135].

During the design stage, for each of the set performance goals, an evaluation of the set of redesign heuristics should take place. This evaluation must focus on those heuristics that are known to bring about improvements along the particular dimension of the performance goal in question. For example, if the performance goal is to reduce the average cycle time of a particular business process by 15%, then that performance dimension would be *time*. For each of the redesign heuristics, it is known to which performance dimensions of the Devil's Quadrangle it generally makes a positive contribution, based on what was accomplished with that redesign heuristic established on previous occasions. While that may be no guarantee for a successful application in a new context, it is nonetheless a good starting point.

To explain how this may work, consider the selection of redesign heuristics in Figure 8.4.

Time	Cost	Quality	Flexibility
Parallellism Case-based work	Activity elimination Empower	Empower Triage	Flexible assignment Centralization

Fig. 8.4 A selection of redesign heuristics

For each of the four performance dimensions of the Devil's Quadrangle, two sample redesign heuristics are listed in Figure 8.4. These are the following:

Parallelism: "Put activities in parallel". Activities in a business process are often ordered in a strictly sequential way even though there is no good reason for doing so. Some activities may well be carried out in an arbitrary order or even simultaneously. By allowing a less restrictive choice on the order in which activities are executed, a business process can be carried out faster.

Case-based work: "Remove batch-processing and periodic activities". Notable sources of delays in business processes exist where individual cases (a) get piled up in a batch that is only processed once all its items are available or (b) are slowed down by periodic triggers, e.g., a computer system is only available at one specific slot during the day. Getting rid of such constraints is in general a good way to significantly speed up a process.

Activity elimination: "Eliminate unnecessary activities". Over time, processes get clogged up with activities that were useful at some point but have lost their purpose or rationale. Control activities, i.e., activities that are incorporated in a process to fix problems, are prime examples of non-value adding activities. Getting rid of unnecessary activities is an effective way to reduce the cost of handling a case.

Empower: "Give workers decision-making authority". In traditional settings, people have to authorize the outcomes of activities that have been performed by others. If workers are empowered to take decisions autonomously, this may render much of the work of middle managers superfluous, in this way reducing cost significantly.

Triage: "Split an activity into alternative versions". By creating alternative versions of an activity, it is possible to better deal with the variety of cases that need to be processed. An alternative activity essentially pursues the high-level goal of the original activity but is either geared specifically to a sub-category of cases that are being encountered (e.g., orders of special customers vs. all customers) or exploits the characteristics of the resource class that is assigned to it (e.g., senior clerks vs. all clerks). By aligning work more specifically to the properties of particular cases, the quality of work delivered improves.

Case assignment: "Let participants perform as many steps as possible". If someone carries out an activity, then that person becomes acquainted at some level with the case for which the work is done. That knowledge accumulates with each activity that is done for the same case. By making one participant the preferred

resource for any work that needs to be carried out for a particular case, this knowledge can be leveraged to deliver a high standard of work.

Flexible assignment: "Keep generic participants free for as long as possible". Suppose that an activity can be executed by either of two available participants, then it should be assigned to the most specialized person. In this way, the likelihood to commit the free, more generally qualified participant to another work package is maximal. The advantage of this heuristic is that an organization stays flexible with respect to assigning work.

Centralization: "Let geographically dispersed resources act as if they are centralized". This heuristic is explicitly aimed at exploiting the benefits of a Business Process Management System (BPMS) (see Chapter 10). After all, if a BPMS takes care of assigning work to process participants it becomes less relevant where these resources are located geographically. In this way, resources can be committed more flexibly.

Let us now look at how this may work. Imagine the hypothetical car rental agency *Frequenz*, which wishes to improve the business process that takes care of collecting rental cars on their return. Their interest is to improve that process from both a time and quality perspective. The existing business process involves four major steps, which are carried out in the following order for all returned cars: (a) an interview with the tenant on specific circumstances during the rental period; (b) an inspection of the exterior of the returned car; (c) an inspection of the interior of the returned car; (d) the completion of the customer invoice on the basis of the outcomes of the previous activities.

To improve the timeliness of the business process, *Frequenz* would need to consider the parallelism and case-based work heuristics first. Indeed, the agency may want to consider carrying out activities (a), (b), and (c) simultaneously (parallelism). No constraints can be lifted through the application of the case-based work heuristic, though; this heuristic is not applicable in this situation.

From a quality perspective, the triage and case assignment heuristics are the first relevant heuristics to look at. On reflection, it may indeed make sense to develop specific versions of activities (b) and (c) for *off-road* vehicles, because they generally suffer more during rental contracts; in this way, a more thorough inspection of returned off-road vehicles can take place, improving the quality of activities (b) and (c). It may also be beneficial to have one participant carry out all steps (case assignment), such that for example all information gathered during (a) can be used to improve the thoroughness of activities (b) and (c), as well as the completeness of (d). *Frequenz*, however, realizes how this may interfere with their earlier decision to carry out these steps simultaneously to gain time. On reflection, the agency prefers to not implement this heuristic in favor of the parallelism heuristic.

Note how in this example both a reflection on the heuristics individually and the clustering of feasible heuristics has taken place. These are essential elements of the *design* stage of the Heuristic Process Redesign method. In the above case, only one scenario is generated. What also becomes clear from the example is that it may be

necessary to gather specific insights into the process itself, the circumstances under which it operates, and its historic performance.

Exercise 8.9 In recognition of the Devil's Quadrangle, each heuristic can also have negative side-effects when applied. Can you imagine what negative impact the *Frequenz* redesign scenario may have on the performance of the rental car collection process in terms of Cost and Flexibility?

This ends our description of Heuristic Process Redesign specifically and our discussion of transactional process redesign methods on a more general level. The next section will look into transformational methods for process redesign.

8.3 Transformational Methods

In the same way as we did for the transactional redesign methods, we will provide an overview of existing transformational methods. We will deal with all the examples that are mentioned in Figure 8.3. After this walkthrough, we will discuss three methods in more detail, focusing again on the *technical challenge* of redesign. The methods we will discuss are: NESTT, Business Process Reengineering, and Product-Based Design.

8.3.1 Overview of Transformational Methods

What can be immediately noticed in Figure 8.3 is that fewer methods populate the transformational, right-hand side of the Redesign Orbit than the transactional, left-hand side of this figure. This characterizes the state of the art quite well, which may be a bit surprising given how process redesign started out. What is generally considered as the first call for the redesign of business processes and the first attempt to identify enduring patterns for this endeavor is known as *Business Process Reengineering*, as pioneered by the late Michael Hammer [59]. One of the core concepts in this method, as we will discuss in more detail in Section 8.3.2, is that it assumes a *clean slate* for the design of a process. As Hammer put it:

> For many, reengineering is the only hope for breaking away from the antiquated processes that threaten to drag them down.

Such a sentiment clearly embraces a breakthrough type of change, a transformation in fact. In other words, process redesign started out as purely transformational through the advent of Business Process Reengineering, but over time transactional redesign methods have become more prevalent and more popular than the revolutionary approach Hammer evangelized.

Exercise 8.10 Can you think of a reason why transactional methods for redesign have become more popular than transformational methods?

Despite the noted imbalance between the two halves of the Redesign Orbit, transformational methods are indeed being applied by organizations and new methods do appear regularly on the horizon. Interestingly, a number of these methods have actually become popular *without* a particular focus on business processes at first. After an initial focus on entire organizations or products, process-specific applications of such methods were developed. A good example is *Design-led Innovation* (or *Design-driven Innovation).* This foundational method aims to provide organizations with an understanding of the deep emotional ties that consumers develop with their products. Its basic tenet is that people are not only served by the form and function of a product, but also through the *experience* its usage invokes. Based on this understanding, organizations may pursue innovations that customers do not expect, but which they eventually grow passionate about. The method was developed by Roberto Verganti [184], who over a period of 10 years studied successful design companies, such as Apple, Nintendo, and Alessi. The method goes through stages of listening (gaining knowledge on what people desire), interpreting (combining user knowledge with a firm's capabilities), and addressing (preparing customers and supporting socio-cultural change). Crucial aspects of the method are: (1) the aim for radical innovation, which explains the *transformational* characterization of the method, (2) the exploitation of the network of outsiders to gain that crucial understanding in the listening stage, which makes the method specifically *outward-looking*, and (3) its reliance on the ingenuity of designers, scientists, and artists, which gives it its *creative* flavor. Particularly those business processes where customer interaction is a crucial element are good candidates to be overhauled through Design-led Innovation: new ways of how an organization interacts with its clients may contribute to a more meaningful experience.

Exercise 8.11 Can you come up with examples of business processes where customer interaction is crucial?

Another example of an inspiring model for a method to redesign business processes in a transformative way is the *Business Model Canvas*, as developed by Alexander Osterwalder and Yves Pigneur [122]. The Business Model Canvas is a visual chart that shows how an organization's value proposition relates to its infrastructure, customers, and financial structure. It is particularly valuable to develop and assess new value propositions because it supports the strategic evaluation of important organizational assets. Inspired by this way of thinking, the so-called Process Model Canvas has been developed that allows firms to reason about the value proposition behind their business processes in a similarly visual way. The *Process Model Canvas*[4] is shown in Figure 8.5.

As can be seen, the canvas shows blank spaces under the various headings, which are to be discussed and filled in during a workshop session. The key way

[4] See www.processmodelcanvas.org.

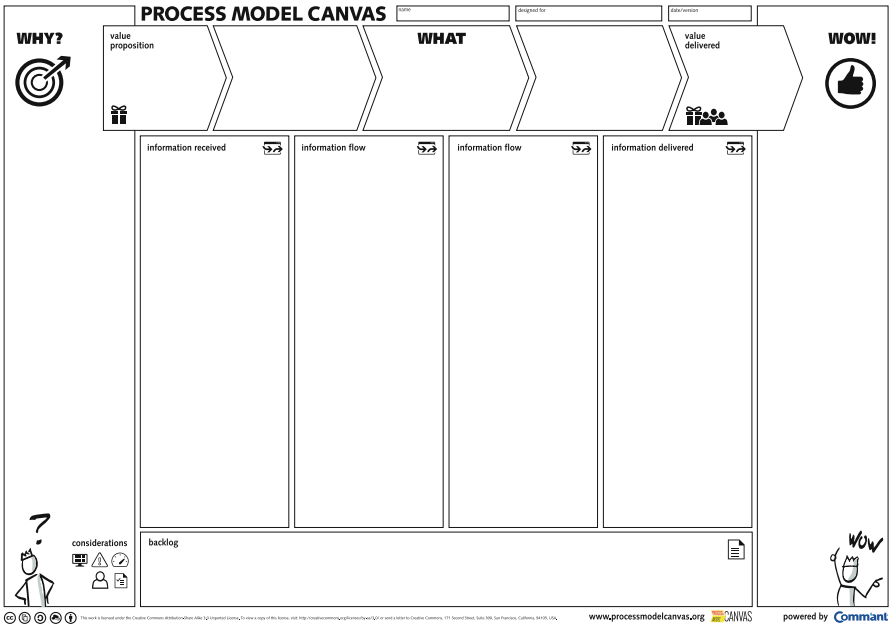

Fig. 8.5 The Process Model Canvas

of using the canvas is to start reasoning from the *wow!* factor behind a business process (see the right-hand side of the figure), i.e., what people in such a workshop think would truly impress customers. This vision is then used to determine *what* is necessary to establish this effect in terms of the major steps in the business process and the information that is required to support those steps. The final connection that needs to be made is that from the business process to the strategic focus of the firm, the *why?* on the left-hand side. In this way, the method reasons from the expectations of the customer (*outward-looking*) to create a breakthrough process design (*transformative*) through a workshop-based use of a visual aid (*creative*).

Exercise 8.12 What do you find to be the key similarity between designing processes according to the principles of Design-led innovation and the Process Model Canvas?

The final redesign method that is part of the same intersection as Design-led Innovation and the Process Model Canvas is *NESTT*, a recent addition to the spectrum. The method has been developed at Queensland University of Technology. The NESTT acronym captures the four main stages of the method: Navigate, Expand, Strengthen, and Tune/Take-off. Its defining feature is how participants in a workshop setting use the spatial affordances of a dedicated room (see Figure 8.6).

Between 8 to 10 people use the four walls and the floor of the room to visualize and address different viewpoints on a business process. They start at formulating a vision on the new process, which may be inspired by, for example, vendors

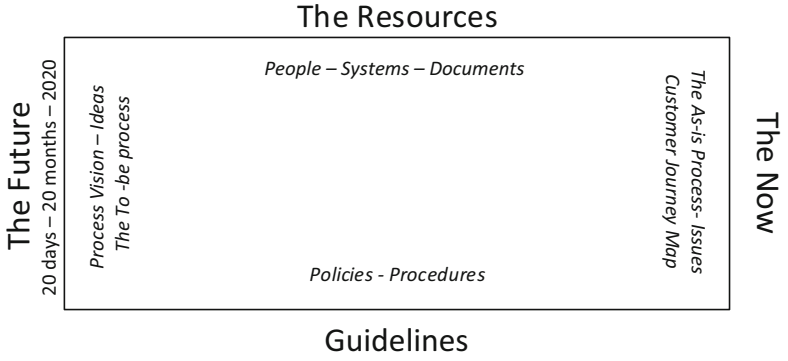

Fig. 8.6 The NESTT room

of new technologies or benchmark organizations. This gives NESTT a dominant *outward-looking* perspective. As can be seen in Figure 8.6, that future vision is given shape over three different time horizons: 20 days from the initiation of the NESTT application, 20 months from that time, and 3 years (considering a start time in 2017). By committing to this vision, the participants determine how to overcome problems and seize opportunities to realize that vision, while using insights from the existing process (the Now), available and required resources, as well as relevant procedures. The creative element is strong in this method, since it exploits a range of techniques to help people design a new process together. Although it is important that there is an outcome in the short term, NESTT is indeed a transformative method because of the long-term perspective it also fosters.

Exercise 8.13 What do you find the key similarity between designing processes according to the Process Model Canvas on the one hand and the principles of NESTT on the other? What is different?

This discussion ends the overview of transformational redesign methods. As can be seen in the Redesign Orbit, the intersection of inward-looking and transformational methods is actually empty. This signals a wide-held belief that true transformations hardly emanate from reasoning from an internal perspective only. This does not mean that the internal perspective is completely ignored, of course (consider NESTT, for example). What is striking is that all transformational methods we discussed so far are *creative* in nature. This is, however, not a universal feature. There are two transformational methods in the Redesign Orbit that are not discussed so far: Business Process Reengineering and Product-Based Design. We will be looking at these methods, which are both analytical in nature, in the coming sections.

8.3.2 Business Process Reengineering

Business Process Reengineering as a concept was coined by Michael Hammer at the start of the 1990s. This point in time is considered by many as the true start of process redesign methods and even that of Business Process Management as a discipline. Hammer had been studying a number of businesses that were under huge pressure but managed to survive and even thrive. The most famous case study is that of the Ford Motor Company, which we presented on page 11 in Chapter 1.

There are three main insights that Hammer distilled from his observations. First of all, no successful organization relies on piecemeal improvement of what was already carried out. Rather, strong ambition leads to huge rewards. Secondly, while information technology is a crucial asset in redesigning business processes, it is necessary to go beyond pure automation of what is already being done. Hammer summarized these two insights:

> We have the tools to do what we need to do. Information technology offers many options for reorganizing work. But our imaginations must guide our decisions about technology—not the other way around. We must have the boldness to imagine taking 78 days out of an 80-day turnaround time, cutting 75% of overhead, and eliminating 80% of errors. These are not unrealistic goals. If managers have the vision, reengineering will provide a way.

The third of Hammer's insights is that organizations need to break away from a set of ingrained patterns of organizing work that prevent business processes from being carried out in an integrated, cross-functional way. Instead, a set of new principles need to be adopted. The reliance on such a set of clearly defined principles, in contrast to what a group of people comes up with, is what makes Business Process Reengineering a decidedly *analytical* method. At the same time, it is mostly *inward-looking* as it still operates within the scope and context of the existing process it aims to overhaul.

Unlike the transactional methods we discussed in detail in Sections 8.2.2 and 8.2.3, the principles of Business Process Reengineering are not embedded in an explicit, staged view on how to carry out process redesign. This can be explained by the pioneering nature of the method. At the time of its inception, it was more important to convince people of the viability of redesign itself than to exactly prescribe it. The principles are, nonetheless, clearly linked to the *technical challenge* of creating a new process design. We will now take a look at a number of these principles.

The first ingrained yet antiquated pattern that Hammer identified is that many organizations collect the same information repeatedly, even to the extent that different departments and units use their own requirements and forms for obtaining the same information. Even though this may have made sense in times when it was difficult to share and distribute data within a single organization, nowadays database technology, networking facilities, and cloud solutions make this information gathering behavior obsolete.

The positive counter principle is to make sure that information is captured fresh, at the moment it is produced, and at the source by the stakeholder who is producing

it. This information needs to be made available to others who are in need of and authorized for its reuse, principally through a shared data store. This will render superfluous sending documents or emails around with the data produced in the process. Equally important, it will prevent clients from getting annoyed being asked for the same information time and again. Anybody who has been through some type of mildly complex procedure in a hospital may recognize this phenomenon.

The second problem that Hammer identified is that workers who are producing a particular piece of valuable information cannot follow up on that information, either because they are not allowed to do so or lack the facilities. This arrangement particularly reflects the belief that people at lower organizational levels are incapable of acting on information they generate. As a result, many organizations end up with units that do nothing else than collecting and processing information that other departments created. Needless to say, this creates inefficiencies and introduces delays.

To counter this problem, the second principle behind Business Process Reengineering is that information processing work, i.e., work that involves capturing or processing information, is to be integrated with the real work where this information is produced. Clearly, this may require a different level of trust and may also involve training people to take on more types of work. What it may bring is that work flows much more smoothly.

The third, undesirable situation as found within many organizations is that hyper-specialized departments have emerged. These handle everything that looks like "their work". In this way, one department ends up being the customer of a sister department for something they desire themselves, could in principle take care of themselves, but are not longer allowed to do so. Think, for example, of a group who wishes to purchase office items but can only do so through dealing with its specialized purchasing department, which is also taking care of purchasing the expensive raw materials that the company uses for its main products. While a centralized approach pursues the benefits of specialization and economies of scale, many internal processes are slow and bureaucratic. The main reason behind this is that the unit that takes care of a process is not the prime beneficiary of its outcomes and may find it has more important things to do.

In a setting where process participants and even clients can be supported by data and technology to accomplish their objectives, it makes sense to allow, at least in a number of situations, that workers who need something should take care of it. Those who have an interest in the output of a process should not only participate in it but potentially drive it all the way. Another way of looking at it is that according to this principle work can be pushed to the actor that has the best incentive to do it, which may positively influence the timeliness and quality of what is accomplished.

The last ingrained pattern of many organizations that they get rid of is the sharp distinction between those who do the work from those who monitor the work and make decisions about it. As Hammer puts it:

> The tacit assumption is that the people actually doing the work have neither the time nor the inclination to monitor and control it and that they lack the knowledge and scope to make decisions about it. The entire hierarchical management structure is built on this assumption.

As a result of this pattern, a surplus of accountants, auditors, and supervisors are in place in organizations to check, record, and monitor work. Needless to say that these people induce delays and incur considerable cost.

The principle that is to replace this anti-pattern is to put every decision point in a process preferably at the place where work is performed. Specifically, this relates to work that produces the information that is required to make the decision. In addition, it is a call to seamlessly integrate all control activities into activities that form the core tasks of a process. The counterpart of this is, of course, that process participants have to be provided with the information they need to make the decisions themselves. The importance of this principle is that back-and-forth handoffs between process workers and process managers can be replaced by well-designed controls in the hands of empowered process workers.

Exercise 8.14 Consider the Ford case study described in Section 1.3.2 (page 11) again. Which of the above principles have been applied?

The initial set of principles were just the start of the Business Process Reengineering wave of the early 1990s. Hammer himself added new ones and gradually developed additional insights into the success behind redesign programs. The last and rather recent contribution in this line is an instrument for organizations to assess their level of maturity in managing processes. In its turn, Business Process Reengineering influenced the development of many other methods. This can be seen back, for example, in the heuristics that form the core of Heuristic Process Redesign (see Section 8.2.3).

We will now take a look at the last remaining transformational redesign method: Product-Based Design.

8.3.3 Product-Based Design

The *Product-Based Design* method was developed at Eindhoven University of Technology at the start of the century [134]. It is *analytical* in nature since it relies on a formal, almost purely algorithmic way of developing a new business process. The objective is to completely overhaul a process, which puts it in the *transformative* sphere. To explain why it is *outward-looking*, one needs to consider the artifact that takes center stage in this method: It is the *product* that a business process aims to deliver. The characteristics of that particular product (or the service) are used to, in fact, *reason back* to determine what the process should look like. Think of it as follows: If you like to produce a red, electric car with four wheels, you are certain that the production process at some stage must involve the production or purchasing of a chassis, that there is a step needed to assemble four wheels to that chassis, that you will need to insert a battery at some point, and that you will need to paint

the vehicle (if you cannot get your hands on red parts, that is). Perhaps you are not sure in what order these things need to take place exactly, but you can at least identify some logical dependencies. For example, you would be better off painting the vehicle *after* you acquired the chassis.

The idea behind Product-Based Design is that by *ignoring* the existing process and purely considering the features of the product, it becomes feasible to develop the leanest, most performative process possible. While Product-Based Design is more ambitious in nature than transactional redesign methods, it is also more limited in its application scope. It has been specifically developed to design processes that produce *informational* products, e.g., decisions, proposals, documents, permits, etc. It is this informational product that is analyzed and laid down in a *product data model*. There is a striking resemblance between this model and the *bill-of-material* (BOM) as used in the manufacturing domain. The product data model is the main vehicle that a process designer uses to determine the best process structure to create and deliver that product. Given that there are, in general, multiple ways to produce an informational product, Product-Based Design discloses insights into all of these possibilities.

The most important stages of Product-Based Design are the following:

1. Scoping: In this initial phase the business process is selected that will be subjected to the redesign. The performance targets for this process are identified, as well as the limitations to be taken into consideration for the final design.
2. Analysis: A study of the product specification leads to its decomposition into information elements and their logical dependencies in the form of a *product data model*. The existing business process—if any—is diagnosed to retrieve data that is both significant for designing the new business process and for the sake of evaluation.
3. Design: Based on the redesign performance objectives, the product data model, and estimated performance figures, one or more process designs are derived that best match with the design goals.
4. Evaluation: The process designs are verified, validated with end users, and their estimated performance is analyzed in more detail. The most promising designs can be presented to the commissioning management to assess the degree in which objectives can be realized and to select the most favorable design to be implemented.

These phases are presented in a sequential order, but in practice it is often desirable that iterations will take place. For example, the evaluation phase is explicitly aimed at identifying design errors, which may result in rework on the design. The remainder of this section will focus on two important elements of the method: The product data model and the derivation of a process design from it.

The Product Data Model

In the analysis phase, sources are gathered that may shed light on what producing a particular product exactly entails. The purpose is to identify:

1. information elements: the pieces of information that are needed at some stage in creating an informational product,
2. dependencies between information elements: insights into which pieces of information are needed to derive other pieces, and
3. production logic: the way information elements can be combined to arrive at new information.

For example, to design a process that evaluates loan applications, we can identify a number of *information elements* that will play a role in this process: the purpose of the loan, the requested amount, and the financial status of the applicant. The decision to grant a loan will *depend* on these three elements. The involved logic may be that loans for certain purposes are automatically declined, for example when they relate to ecologically damaging projects, but otherwise granted if the financial position of the client at least meets a range of criteria.

For a proper representation of this information, a tree-like structure is used, which is referred to as a *product data model*. This structure is different from the traditional BOM found in manufacturing. This is due to several differences between informational products and physical products. These differences lead to two important characteristics of a product data model. First, the same piece of information may be used to derive various other information elements. For example, the age of an applicant for a life insurance may be used to estimate both (a) the involved health risks for that patient and (b) the risks of work-related accidents. Secondly, there may be multiple ways to derive the same piece of information. For example, health risks may be estimated using either a patient questionnaire or a full medical examination of that patient.

A graphical example of a product data model is shown in Figure 8.7. All nodes in this figure correspond to information elements that may be used in a hiring process of helicopter pilots by the Dutch Air force. Arcs are used to express the dependencies between the various pieces of information, i.e., the information elements.

The meaning of the information elements is as follows:

- A: the candidate's suitability to become a helicopter pilot,
- B: the candidate's psychological fitness,
- C: the candidate's physical fitness,
- D: latest outcome of tests on candidate in the previous two years,
- E: quality of the candidate's reflexes,
- F: quality of the candidate's eye-sight.

In general, each incoming arc of a node in a product data model signifies an *alternative way* of determining a value for the corresponding information element for a specific case. If outgoing arcs of multiple nodes are *joined*, this means that

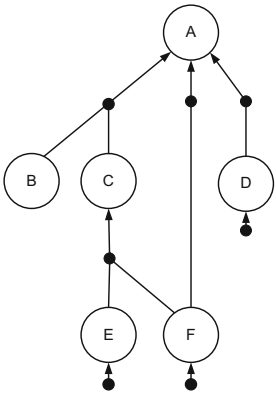

Fig. 8.7 A sample product data model

values of all of the corresponding information elements are required to determine a value for the information element the arrow leads to. There are also information elements which have incoming arrows that do not originate from other information elements. These relate to those elements that do not rely on the values of other information elements, e.g., element B. We will refer to such information elements as *leaf elements*.

One of the things that is expressed in Figure 8.7 is that there are three ways to determine a value for information element A. The suitability of a candidate (a) can be determined on the basis of:

1. the combined results of the candidate's psychological test (B) and physical test (C),
2. the result of a previous suitability test (D), or
3. the candidate's eye-sight quality (F).

The way in which a new piece of information can be determined on the basis of one or more pieces of other information is called a *production rule*. A production rule specifies how the value of an output information element may be determined on the basis of the values of its inputs. The description of a production rule may be given in pseudo code or another rather precise specification language. For example, using the Helicopter Pilot product data model again, the production rule that relates to the use of a value for F to determine a value for A may be: "If a candidate's vision of either or both eyes as expressed in diopters is above $+0.5$ or below -0.5, then such a candidate is considered as *unsuitable* to become a helicopter pilot". A complete product data model describes all the involved production rules. Such a complete description is referred to as the *production logic*. In reality, different production rules may be applicable under different circumstances. We just considered the example that a candidate's eye-sight is so bad (F) that the candidate is not considered suitable (A). However, in the more common case, the quality of eye-sight is only one of the many aspects that are incorporated in a physical test (B), which should be combined with the outcome of the psychological test (C) to determine the suitability result (A).

Deriving a Process

From a product data model and the production logic, it becomes clear what the relevant information is, what the dependencies are, and what logic is involved. This is the basis to derive alternative designs for a process. The essential principle is that each *walk* through a product data model, i.e., starting from one or more of the leaf elements, through the derivation of information elements in the middle layer of a product data model, all the way up to the top element, is a valid way of executing a business process to create the desired product. Against this background, a process design is nothing more than determining what the preferred way of traversing a product data model is from bottom to top.

What is crucial to note is that for many products that are decomposed in the form of product data models, it becomes clear that there are different paths to establish the same end result. Each of these paths has its own performance characteristics, which renders it more or less attractive than its alternatives. For example, in the case of the hiring example, the target may be to minimize cost. In that case, it may be wise to first check what the quality of a candidate's eyes are: if this does not lead to an immediate rejection, then the other tests are carried out. If overall speed of the process is more important than cost, it may be preferred that the hiring staff immediately start checking the quality of eye-sight *and* the reflexes of a candidate.

Obviously, the expected performance, speed, and cost of determining pieces of information are crucial aspects in determining what the best process design is. Accordingly, Product-Based Design involves various steps to collect and validate this important information. The most algorithmic indication of the overall method is that tools are available to generate various process designs on the basis of a complete product data model. The newest version of the method does not even prescribe a single best way of traversing the product data model anymore, but allows process participants to decide on this by a case to case basis [182]. Flexible case management technology with knowledge of the product data model supports a process participant in deciding how to best carry out the process for each individual case.

8.4 Recap

In this chapter, we discussed the motivation for process redesign. We offered two views on the importance of process redesign: one from a positive angle, which shows how process innovation is often a good follow-up strategy for organizations after they spent time innovating their products; the other view considers redesign as a necessary medicine against organizational entropy. We also stressed that process redesign methods may be useful for the design of entirely new processes.

We delineated process redesign closer by focusing on a number of relevant elements: customers, business process operation, business process behavior, organization structure, organization population, information, technology, and the external

environment. Using these elements, we explained how process redesign is different from other organizational measures or programs. The Devil's Quadrangle helped us to clarify that many redesign options have to be discussed from the perspective of a trade-off between time, cost, quality, and flexibility.

We also sketched the spectrum of redesign methods in the form of the Redesign Orbit. We identified three axes to distinguish such methods from each other: nature, ambition, and perspective. The remainder of the chapter was devoted to a discussion of transactional redesign methods on the one hand and transformational methods on the other. For each side, two methods were discussed in detail, in particular with respect to the technical challenge of redesign: 7PE, Heuristic Process Redesign, Business Process Reengineering, and Product-Based Design.

8.5 Solutions to Exercises

Solution 8.1 This is a hands-on exercise. A potential approach to this question might be to think of companies that offered services which are now provided by other companies via the Internet.

Solution 8.2 This is a hands-on exercise. Aside from new regulations or healthcare innovations, new processes may spring from the business models of start-ups, the integration of a new service along with an existing product (e.g., maintenance contract), a new source of data collection (e.g., fitness information from a smartwatch that is turned into health advice), etc.

Solution 8.3

1. "An airline has seen its profits falling over the past year. It decides to launch a marketing campaign among its corporate clients in the hope that it can extend its profitable freight business": Not a redesign initiative, no link to process.
2. "A governmental agency notices that it is structurally late to respond to citizens' queries. It decides to assign a manager to oversee this particular process and to take appropriate counter actions": Redesign, refers to *participants* and the *business process* itself.
3. "A video rental company sees that its customer base is evaporating. It decides to switch to the business of promoting and selling electronic services through which clients can see movies online and on-demand": Not so much a process redesign initiative; although there is certainly a link to process and products, this is much more a strategic initiative.
4. "A bank notices internal conflicts between two different departments over the way mortgage applications are dealt with. It decides to analyze the role of the various departments in the way applications are received and handled to come up with a new role structure": A redesign initiative, touches *process* and *participants*.

5. "A clinic wants to introduce the one-stop-shop concept to improve over the situation that its patients need to make separate appointments for the various diagnostic tests that are part of a procedure for skin cancer screening": A redesign initiative, touches *process* and *customers*.

Solution 8.4

1. Dealing with a customer complaint: Suitable.
2. Carrying out cardiovascular surgery: Mildly suitable, there are physical constraints involved here.
3. The production of a wafer stepping machine: Not very suitable, highly physical process.
4. Transporting a package: Mildly suitable, there are physical constraints involved here.
5. Providing financial advice on composing a portfolio: Suitable.
6. Designing a train station: Suitable.

Solution 8.5

1. "A new computer application is developed that speeds up the calculation of the maximum loan amount that a given client can be offered": Time is positively affected, development of the application may be costly.
2. "Whenever a clerk wants to have a quote from a financial provider, the clerk must use a direct messaging system instead of email": Quality and time may be positively influenced since the feedback is obtained directly and may be more to the point. Quality may also be negatively affected, depending on the kind of feedback this interaction generates.
3. "By the end of the year, additional, temporary workers are hired and assigned to picking items for fulfilling Christmas orders": This provides more flexibility which may also be exploited to improve timeliness. It's clearly a costly affair and temporary workers may deliver lower quality since they are less familiar with the operations.

Solution 8.6 TQM is seen by many as a predecessor to BPM and its focus on process redesign. What is clear is that TQM is not about making breakthrough innovations, but aims at continuous and gradual improvement. In this sense, it should be considered as *transactional*.

Solution 8.7 This is a hands-on exercise. The interested reader who is looking for inspiration to test his or her knowledge may want to take a look at the Wikipedia entry for business process reengineering[5] for a list of industrial redesign methods.

Solution 8.8 A variety of critical views on brainstorming exist, which can easily be found by an Internet search. A concise overview of explanations why brainstorming

[5] https://en.wikipedia.org/wiki/Business_process_reengineering.

may be not be so effective to solve problems or stimulate creativity can be found in [24], which mentions *social loafing*, *social anxiety*, *regression to the mean*, and *production blocking*.

Solution 8.9

- Cost: To carry out the various activities truly simultaneously, different participants must be available to carry out those activities. Depending on the situation, this may incur cost.
- Flexibility: By creating alternatives of a single activity, the process becomes more complex. If these alternative tasks all need to be changed for the same reason, for example due to new legislation or technology, the process has becomes less flexible.

Solution 8.10 In general, transformational methods tend to be more risky as they break away from existing, known procedures. This has a negative effect on the success rate of programs that rely on transformational methods. Over time, organizations have tended to favor redesign projects with an almost guaranteed level of establishing at least some level of improvement; hence, the popularity of transactional redesign methods.

Solution 8.11 You may think of services where the interaction with an advisor is actually what would make the process attractive for a customer. For example, private banking is an area of financial services where so-called "high net worth individuals" are provided with personalized advice on how to manage their assets. Similarly, specialized travel agencies that develop customized travel plans would rely on excellent customer interaction.

Solution 8.12 Clearly, different similarities exist. Both methods heavily rely on the creative input of people. Even more strikingly, both methods pursue deeply impressing a customer as the design starting point.

Solution 8.13 Again, various similarities can be picked out. The use of a physical aid (canvas, walls, room) to support the redesign process is a strong similarity. A decidedly different aspect is the explicit identification of different timelines within the NESTT approach versus the single timeline in the application of the Process Model Canvas.

Solution 8.14 The decision to let warehouse personnel immediately check whether a delivery actually matched what was originally purchased is an example of *subsuming information-processing work into real work*. To not collect the same information from the vendor through both an invoice and a notice can be seen as an instantiation of *capturing information once*.

8.6 Further Exercises

Exercise 8.15 The following text is the literal description of a redesign case at IBM Credit Corporation, taken from the book "Reengineering the Corporation" by Hammer and Champy [62]. It is split up into several parts. Please read these and answer the questions.

> Our first case concerns IBM Credit Corporation, a wholly owned subsidiary of IBM, which, if it were independent, would rank among the Fortune 100 service companies. IBM Credit is in the business of financing the computers, software, and services that the IBM Corporation sells. It is a business of which IBM is fond, since financing customers' purchases is an extremely profitable business. In its early years, IBM Credit's operation was positively Dickensian. When IBM field salespersons called in with a request for financing, they reached one of fourteen people sitting around a conference room table in Old Greenwich, Connecticut. The person taking the call logged the request for a deal on a piece of paper. That was step one. In step two, someone carted that piece of paper upstairs to the credit department, where a specialist entered the information into a computer system and checked the potential borrower's creditworthiness. The specialist wrote the results of the credit check on the piece of paper and dispatched it to the next link in the chain, which was the business practices department. The business practices department, step three, was in charge of modifying the standard loan covenant in response to customer request. Business practices had its own computer system. When done, a person in that department would attach the special terms to the request form. Next, the request went to a pricer, step four, who keyed the data into a personal computer spreadsheet to determine the appropriate interest rate to charge the customer. The pricer wrote the rate on a piece of paper, which, with the other papers, was delivered to a clerical group, step five. There, an administrator turned all this information into a quote letter that could be delivered to the field sales representative by Federal Express.

(a) Model the described business process. Use pools and lanes where needed.

> The entire process consumed 6 days on average, although it sometimes took as long as 2 weeks. From the sales reps' point of view, this turnaround was too long, since it gave the customer 6 days to find another source of financing, to be seduced by another computer vendor, or simply to call the whole deal off. So the rep would call and call and call to ask, "Where is my deal, and when are you going to get it out?" Naturally, no one had a clue, since the request was lost somewhere in the chain.

(b) Which dimension of the Devil's Quadrangle would be dominant for a redesign? Give an exact definition of the performance criterion.

> In their efforts to improve this process, IBM Credit tried several fixes. They decided, for instance, to install a control desk, so they could answer the rep's questions about the status of the deal. That is, instead of each department forwarding the credit request to the next step in the chain, it would return it to the control desk where the calls were originally taken. There, an administrator logged the completion of each step before sending the paper out again. This fix did indeed solve one problem: The control desk knew the location of each request in the labyrinth and could give the rep the information they wanted. Unfortunately, this information was purchased at the cost of adding more time to the turnaround.

(c) Model the adapted process. Use pools and lanes where needed. (d) Can you explain in terms of the performance dimensions of the Devil's Quadrangle what has happened?

> Eventually, two senior managers at IBM Credit had a brainstorm. They took a financing request and walked it themselves through all five steps, asking personnel in each office to put aside whatever they were doing and to process this request as they normally would, only without the delay of having it sit in a pile on someone's desk. They learned from their experiments that performing the actual work took in total only 90 min—one and a half hours. The remainder—now more than 7 days on average—was consumed by handing the form off from one department to the next. Management had begun to look at the heart of the issue, which was the overall credit issuance process. Indeed, if by the wave of some magic wand the company were able to double the personal productivity of each individual in the organization, total turnaround time would have been reduced by only 45 min. The problem did not lie in the activities and the people performing them, but in the structure of the process itself. In other words, it was the process that had to change, not the individual steps.
>
> In the end, IBM Credit replaced its specialists-the credit checkers, pricers, and so on-with generalists. Now, instead of sending an application from office to office, one person called a deal structurer processes the entire application from beginning to end: No handoffs.
>
> How could one generalist replace four specialists? The old process design was, in fact, founded on a deeply held (but deeply hidden) assumption: that every bid request was unique and difficult to process, thereby requiring the intervention of four highly trained specialists. In fact, this assumption was false; most requests were simple and straightforward. The old process had been over-designed to handle the most difficult applications that management could imagine. When IBM Credit's senior managers closely examined the work the specialists did, they found that most of it was little more than clerical: finding a credit rating in a database, plugging numbers into a standard model, pulling boilerplate clauses from a file. These activities fall well within the capability of a single individual when this is supported by an easy-to-use computer system that provides access to all the data and tools the specialists would use.
>
> IBM Credit also developed a new, sophisticated computer system to support the deal structurer. In most situations, the system provides the deal structurer with the guidance needed to proceed. In really tough situations, the deal structurer can get help from a small pool of real specialists-experts in credit checking, pricing, and so forth. Even here, handoffs have disappeared because the deal structurer and the specialists he or she calls in work together as a team.
>
> The performance improvement achieved by the redesign is extraordinary. IBM Credit slashed its seven-day turnaround to 4 h. It did so without an increase in head count-in fact, it has achieved a small head-count reduction. At the same time, the number of deals that it handles has increased a hundredfold. Not 100 percent, but one hundred times.

(e) Consider the list of heuristics dealt with in this chapter. Which of these can you recognize in the new process redesign?

Exercise 8.16 Indicate in what respect the application of the *Outsourcing* heuristic and the composition of larger activities as a specific case of the *Activity composition* heuristic can lead to similar or different results. Use the performance dimensions of the Devil's Quadrangle and provide specific interpretations.

Exercise 8.17 Consider the equipment rental process described in Example 1.1 (page 3) and the corresponding issues documented in Example 6.5 (page 230).

a Apply the redesign heuristics from Appendix A in order to address the issues documented in Example 6.5.
b Capture the resulting to-be model in BPMN.
c Explain the impact of the changes you propose in terms of the performance dimensions of the Devil's Quadrangle.

Exercise 8.18 Consider the university admission process described in Exercise 1.1 (page 5) and the corresponding issues documented in Exercise 6.4 (page 232).

a Apply the redesign heuristics from Appendix A in order to address the issues documented in Exercise 6.4.
b Capture the resulting to-be model in BPMN.
c Explain the impact of the changes you propose in terms of the performance dimensions of the Devil's Quadrangle.

Exercise 8.19 Consider the process for prescription fulfillment described in Exercise 1.6 (page 30) and the corresponding issues documented in Exercise 6.14 (page 251).

a Apply the redesign heuristics from Appendix A in order to address the issues documented in Example 6.14.
b Capture the resulting to-be model in BPMN.
c Explain the impact of the changes you propose in terms of the performance dimensions of the Devil's Quadrangle.

Exercise 8.20 Consider the procure-to-pay process described in Exercise 1.7 (page 31) and the corresponding issues documented in Exercise 6.15 (page 252).

a Apply the redesign heuristics from Appendix A in order to address the issues documented in Example 6.15.
b Capture the resulting to-be model in BPMN.
c Explain the impact of the changes you propose in terms of the performance dimensions of the Devil's Quadrangle.

Exercise 8.21 Consider the following business process that is carried out at a healthcare institute. Figure 8.8. It shows the Intake process for elderly patients with mental problems, which is styled after the way this is carried out in the Eindhoven region.

The Intake process starts with a notice by telephone at the secretarial office of the healthcare institute. This notice is delivered by the family doctor of the person who is in need of mental treatment. The secretarial worker inquires after the name and residence of the patient. On basis of this information, the doctor is put through to the nursing officer responsible for the part of the region that the patient lives in.

The nursing officer makes a full inquiry into the mental, health, and social status of the patient in question. This information is recorded on a registration form. After this conversation has ended, this form is handed in at the secretarial office of the institute. Here, the information on the form is stored in the information system and subsequently printed. For new patients, a patient file is created. The registration form as well as the printout from the information system are stored in the patient file. Patient files are kept at the secretarial office and may not leave the building. At the secretarial office, two registration cards are produced for respectively the future first and second intaker of the patient. The registration card contains a set of basic patient data. The new patient is added on the list of new notices.

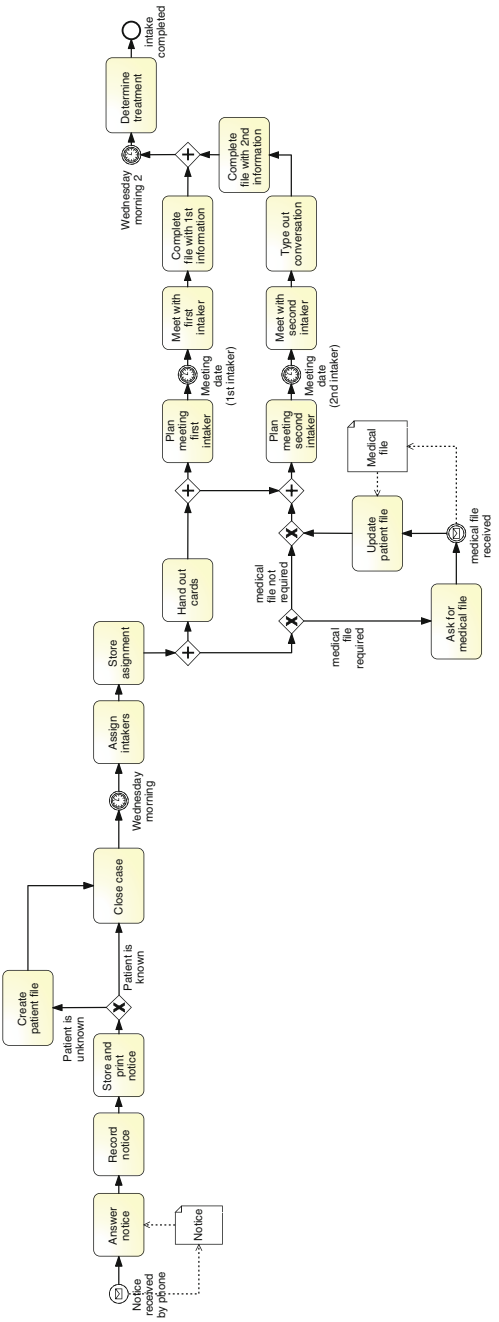

Fig. 8.8 The intake process model

Halfway during each week, on Wednesday, a staff meeting of the entire medical team takes place. The medical team consists of social-medical workers, physicians, and a psychiatrist. During this meeting, the team leader assigns all new patients on the list of new notices to members of the team. Each patient will be assigned to a social-medical worker, who will act as the *first intaker* of the patient. One of the physicians will act as the *second intaker*. In assigning intakers, the team leader takes into account their expertise, the geographical region they are responsible for, earlier contacts they might have had with the patient, and their case load. The assignments are recorded on an assignment list, which is handed to the secretarial office. For each new assignment, it is also determined whether the medical file of the patient is required. This information is added to the assignment list.

The secretarial office stores the assignment of each patient of the assignment list in the information system. It passes the produced registration cards to the first and second intaker of each newly assigned patient. An intaker keeps this registration at times when visiting the patient and being at the office. For each patient for which the medical file is required, the secretarial office prepares and sends a letter to the family doctor of the patient, requesting a copy of the medical file. As soon as this copy is received, the secretarial office will inform the second intaker and add the copy to the patient file.

The first intaker plans a meeting with the patient as soon as this is possible. During the first meeting, the patient is examined using a standard checklist which is filled out. Additional observations are registered in a personal notebook. After a visit, the first intaker puts a copy of these notes in the file of a patient. The standard checklist is also added to the patient's file.

The second intaker plans the first meeting only after the medical information of the physician—if required—has been received. Physicians use dictaphones to record their observations made during meetings with patients. The secretarial office types out these tapes, after which the information is added to the patient file.

As soon as the meetings of the first and second intaker with the patient have taken place, the secretarial office puts the patient on the list of patients that reach this status. For the staff meeting on Wednesday (the same that was mentioned before), they provide the team leader with a list of these patients. For each of these patients, the first and second intaker along with the team leader and the attending psychiatrist formulate a treatment plan. The determination of the treatment plan formally ends the intake procedure.

a Develop two redesign scenarios for the Intake process with the Heuristic Process Redesign method, using the full set as described in Appendix A. For each of the scenarios:

- Clearly define the performance goal;
- List any information beyond that is found in the case description that you assume;
- Specify and motivate which redesign heuristics are part of the scenario.

b For each scenario, model the redesigned process in BPMN.

Exercise 8.22 Consider the booking-to-cash process at Fotof described in Exercise 4.31 (page 155) and the stakeholder analysis and issue register developed in Exercise 6.13. In the spirit of the NESTT method, develop the following:

a A to-be process that can be launched within 20 days.
b A to-be process that can be launched within 20 months.
c A to-be process that can be launched within 3 years.

Apply the redesign heuristics from Appendix A to generate the various scenarios. For each scenario, model the redesigned process in BPMN.

Hint: To get a feel for addressing this exercise in the spirit of the NESTT method, carry it out in cooperation with one or two fellow students. Find consensus on the issues, the way to address these, and the preferred time horizon for doing so.

Exercise 8.23 The following is an excerpt of the stipulations of a Dutch bank concerning medium-length business loans.

> If a medium length loan is made available to a client, the funds that are not fully withdrawn by that client will be temporarily placed on the money market. This temporary placing leads to financial rewards. However, leaving the remaining part of the loan to be available for the client at any time leads to funding costs. If the funding costs are higher than the temporary rewards, then this difference is the basis for a monthly disposal provision, to be paid by the client [..]. The disposal provision amounts to half of the difference between the funding costs and the temporary rewards with a minimum of 1/12% per month [. . .]. The disposal provision is part of the loan proposal.

Develop a product data model where the "loan proposal" is the top information element and the "disposal provision" is one of the other elements. You may leave out the production rules for this exercise.

8.7 Further Readings

Hammer has written many highly readable books with his co-authors on process redesign, for example [60, 62]. Other management books that deal with the topic are, for example, [30, 101, 161]. In contrast to the topic of process modeling, process redesign has not received as much attention from the scientific community. When BPR is studied, the focus is mostly on case studies or the diffusion of the concept in practice itself, for example in what domains it is applied or in which countries it is most popular. One of the most interesting studies in this category is quite dated [121], but it clearly shows the problems of what was initially considered business process redesign and how it quickly evolved over time into a more incremental approach. A very interesting study into the characteristics of different redesign methods is provided in [77], which has inspired various concepts that were dealt with in this part of the book.

The redesign heuristics that were discussed in this chapter have been described in quite some detail. After their initial presentation as best practices in [135], they have been validated and further analyzed in follow-up studies [102, 103]. More

recent efforts by various researchers are aimed at supporting practitioners in making sensible selections of redesign heuristics in specific cases [63, 90]. Also, attempts have been made to extend the set of redesign heuristics to their application in other domains, for example in [119].

How to change organizations by the introduction of ERP systems is a topic that has received broad attention, see for example [57] and [162].

Product-Based Design was developed at Eindhoven University of Technology in cooperation with a Dutch consultancy company. Various case studies are available, which give a better idea of the practical application of this method and its potential benefits [131, 132]. Recently, the emphasis of researchers working on this topic has been moving towards the automatic generation of process designs and the automated support of the execution of such processes [182]. Another way of looking at Product-Based Design is that it is an approach that blends data and process. IBM's artifact-centric approach [27] and the data-driven process structures developed by the University of Ulm [117] are other approaches that go in this direction, but they are process modeling techniques rather than redesign methods.

As mentioned, the NESTT is a very recent redesign method. The interested reader may want to check its description and application in [148]. The book that contains this chapter is a good resource to read about cases of business transformation and process redesign [188].

One of the main open questions in the area of process redesign is to what extent it makes sense to follow industrial reference models or to try and develop company-specific designs. While industrial reference models are offered by many vendors, it is not so obvious that they represent the best possible way to carry out processes.