Introduction

This book is about the management of business processes. This is certainly not a new topic. Since the beginning of the Industrial Revolution, it has been written about from every possible point of view—economic, sociological, psychological, accountancy, mechanical engineering and business administration. In this book, we examine the management of business processes from the perspective of computing, or—to put it more broadly—of information technology. The reason is that information technology has made huge leaps forward in recent years, resulting in the creation of completely new ways of organizing business processes. The development of generic software packages for managing business processes—so-called workflow management systems (WFMS)—is particularly important in this respect.

Until recently, the golden rule was: "First organize, then computerize." This implied that processes were developed with the implicit assumption that the business process would primarily be managed by people. Then an organizational structure would be developed under which groups of people, or departments, were allocated particular tasks. Only then did people consider whether computers—or rather, information systems— could partially support, or even take over, the work. This approach does not sufficiently examine the opportunities offered by information systems. We have now reached a turning point: we first design business processes in a more abstract way, without considering implementation, and then we design the information systems and the organization hand in hand. In fact, we decide whether each task in a process should be performed by an information system or a person.

There are still some problems with this depiction. First, the notion that we can organize business processes differently using information systems

is not new. People have long done this with business processes whose primary task is the processing of information. During the 1970s, serious efforts were made to completely computerize the management of business processes using information systems. This proved impossible with the technology then available. Even today, and for the foreseeable future, there are and will remain many tasks in the business process which can only be performed by people. In reaction to the reckless attempts of the 1970s, the role played by information technology has been somewhat restricted.

Information systems are used to reduce people's workload, particularly in offices. By analyzing thoroughly what people in offices do—by asking why they do it—the following information processing functions have been identified: text writing, drawing, calculating, filing, and communicating information. These analyses have led to the development of the following products: word processors, drawing systems, spreadsheet systems, database systems and electronic-mail systems. All these systems are generic in nature: they are not limited to a specific business application—as, say, accounting systems are—and so are widely used. Thanks to widespread distribution, this software is of high quality and relatively cheap. (In fact, accounting systems are widely usable, but not as extensively as word processors.)

Partly because of this development, the impact made by information technology has increased enormously, which in turn has led to many more people studying the possibilities presented by it. And this has resulted in the "BPR wave." BPR stands for business process redesign (or business process re-engineering) and is a method, for improving the effectiveness and efficiency of business processes. BPR is based upon the notion that, if full use is made of information technology, business processes could be entirely different than at present. It therefore is wise to redesign the current processes completely, in the way described above. How business processes are organized is thus no longer the sole prerogative of the organizational or business expert: the information technologist now also has a major role to play. This is a good thing, because the information technologist is a developer of processes par excellence. After all, every algorithm defines a process. Until recently, however, the role of the information technologist was limited to the processing of information

in computer systems—whereas, in fact, the main task of many other business processes is information processing.

In the past, it was the functional structure of an organization that played the most important role in how it was organized. Now the business processes are crucial. For this, a good frame of reference is required so that processes can be defined and analyzed clearly. Definition is important when preparing a (re)design, and before deciding whether to actually implement a new process it is very important to first establish whether it will work properly. To do this, one must be able to analyze the process defined. This can be done in a number of ways. For example, formal methods can be used to identify processes' properties, or lack of them. Another analysis method uses simulation techniques, sometimes supported by computer animation. Supporting software tools are essential to this.

This book presents a reference framework for defining processes and discusses analytical methods. In doing so, extensive use is made of Petri nets, a formal concept that has been developing since the 1960s and that made particularly significant leaps forward during the 1980s. Petri nets are ideally suited for defining and analyzing complex processes. Another useful property is that they make the definitions easy to understand for non-experts. This eases communication between designers and users. There also exist software tools which support the definition and analysis of processes.

Once new business processes have been developed, they then have to be implemented. The management and, in part, the execution of processes are handled by people, with the help of information systems. As already mentioned, during recent years a new class of generic software has been evolving: workflow management systems. This software supports business processes by taking on their information logistics. In other words, workflow management systems ensure that the right information reaches the right person at the right time, or is submitted to the right computer application at the right moment. A workflow management system does not, therefore, actually perform any of the tasks in a process. Herein lies both its strength—it is generic software and so can be used in many situations—and its weakness: usually actual application software is also needed.

The term "workflow" is used here as a synonym for "business process." We shall, as far as possible, use the terminology developed by the WorkFlow Management Coalition (WFMC). This is an organization dedicated to developing standard terminology and standard interfaces for workflow management systems components.

This book begins by describing the organization of workflows. This is important in order to be able to understand the role which workflow management systems can play and how they should be applied. The terms that are required in order to be able to deal with processes are introduced in an informal way, thus providing a basis for the rest of the book. Then there follows a chapter about modeling workflows. This includes a simple introduction to Petri-net theory. The next chapter covers the management of resources that contribute to business processes. These resources may be people, but can also be machines or computer systems. Techniques for analyzing processes are also considered. Then workflow management systems are introduced, with both their functions and architecture being covered. Then there follows a methodology for developing workflow applications. The final chapter is devoted to a case study of an actual application.

As an appendix, we have included an alphabetical glossary containing all the relevant terms used with their synonyms and short definitions. The first time that an important term is used, it is printed in italics.

This book is intended for students in information technology, industrial engineers, and for those who are professionally involved in implementing BPR using WFMS.