Emerging business models, value configurations, and information technologies interact over time to create competitive advantage. Modern information technology has to be studied, understood, and applied along the time dimension of months and years, where changes are the rule. Such changes created by interactions between business elements and resources are very well suited for system dynamics modeling. System dynamics models represent a framework for understanding both successful and unsuccessful IT management over time. Systems dynamics simulations provide insights into the important interactions between IT investments and firm performance over time.

So many organizations fail in their applications of modern information technology. An important reason for such failure is the lack of understanding of relationships between corporate management and IT management. Relationships between corporate and IT management are not static. Rather, they evolve over time, creating growth or decline in firm performance. The objective of this book is to integrate systems dynamics modeling and IT management to provide a framework for understanding relationships and interactions between business and technology over time.

The most important consequence of this approach to the topic of IT management is that our understanding shifts from event-oriented and sequential management thinking to feedback-oriented and parallel management thinking. The event-oriented thinking is illustrated in Figure 1. Here management discovers a gap between current and desired business situation, leading to decisions, actions, and results.

The feedback-oriented thinking is illustrated in Figure 2. Here management decision-making is part of the business dynamics.
These two thinking styles can lead to very different business behavior over time. Just as an example, Figure 3 illustrates the event approach, while Figure 4 illustrates the feedback-oriented approach.

There are several reasons for the different behaviors in Figure 4 compared to Figure 3. One reason is the way we understand resources that close the gap between desired and current business situation. In event-oriented thinking, management might calculate needed resources as a consequence of the size of the gap, leading to lower resource consumption as the gap decreases, as illustrated in the planning sequence in Figure 1.

In feedback-oriented thinking, resource consumption is determined not only by the gap, but also by business performance. Hence, there are two oppos-

**Figure 1. Event-oriented and sequential management thinking**

**Figure 2. Feedback-oriented and parallel management thinking**
ing mechanisms over time. First, when the gap goes down, then closing gap resources go down. Second, when business performance goes up, then closing gap resources go up, as illustrated in Figure 2.

*Business Dynamics in Information Technology* is the title of this book. Causal loop diagrams as illustrated in Figure 2 and reference modes as illustrated

**Figure 3. Event-oriented business performance management**

![Event-oriented business performance management](image1)

**Figure 4. Feedback-oriented business performance management**

![Feedback-oriented business performance management](image2)
in Figures 3 and 4 will be explained and repeatedly applied throughout this book.

This is a textbook that will be useful to all business schools where management information systems (MIS) courses and decision support systems (DSS) courses, as well as system dynamics, are taught. The book will probably be most useful to graduate students. In addition, managers in charge of IT governance, IT strategy, and IT services will find this book useful in their work.

Theories of the firm, value configurations of the firm, strategic thinking, management roles, technology management, system dynamics, modeling, and simulation are some of the scholarly values of this book. The book makes a significant contribution to the discipline by presenting and applying the dynamic perspective in IT management in organizations.

The integration of system dynamics and IT management is exemplified throughout this book. System dynamics is a modeling technique to represent feedback structures that cause developments to change over time. Information technology management is concerned with applications of IT in terms of information systems that improve and sustain firm performance.

When system dynamics and IT management are integrated, then IT management impacts itself in feedback structures. IT management is not just a one-way practice of making decisions and running systems. Both decisions and operating procedures influence the way users and management perceive IT performance, and both users and management will react to it. Their reaction will in turn influence IT management. That is how IT management impacts itself in feedback structures.

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**Introduction To Chapters**

The overall structure of this book has three parts that represent main messages for the reader:

- *Business-technology alignment processes* are concerned with mutual alignment between business and technology over time. Alignment is the topic in the first chapter about value configurations and there is a later chapter on corporate strategic management. Alignment is related to strategy.
Business-technology interaction processes are concerned with dynamic behavior in system dynamics. This is the topic in many chapters, especially in chapters on the dynamics of e-business, knowledge management, and outsourcing. Interaction is related to system dynamics.

Business-technology decision processes are concerned with decision rights and decision makers in IT governance in the third chapter, as well as the roles of the chief information officer (CIO) and the chief executive officer (CEO) for successful use of IT over time in the eighth chapter. Decision is related to governance.

These three process perspectives are all discussed in most of the book. However, to make it simpler for the reader, each chapter is assigned to one of these processes in Figure 5. But the book is not organized according to these processes, as illustrated by business-technology alignment processes found in chapters 1 and 7. Rather, the book is organized according to IT management topics after two theoretical chapters on resources and dynamics.

Figure 5. Book chapters according to their focus on business-technology alignment, decision, and interaction processes
This book starts by presenting the resource-based theory of the firm in Chapter I. An important business-technology alignment process is the alignment of value configuration, information systems, and IT resources. A value configuration of value shop has very different primary activities from value chains and value networks.

In Chapter I we define the IT resource, which enables the firm to improve and sustain its performance.

Next, the system dynamics perspective is introduced in terms of organizational business dynamics in Chapter II. Here we introduce system dynamics modeling. However, as this book is no textbook on system dynamics, the more complicated parts of modeling—such as stock-and-flow diagrams and parameters for simulation—are left out. Rather, this book focuses on the beginning and the end of the modeling processes, the causal loop diagram and the simulated behavior, which we call reference mode.

Information technology governance has emerged as an important discipline to improve information technology performance in organizations. Information technology governance is concerned with decision rights, resource mobilization, and alignment. The areas for IT governance have been categorized into IT principles, IT infrastructures, IT architectures, IT applications, and IT investments. In Chapter III, we take a dynamic look at these decision areas.

In the following three chapters, important topics in MIS are discussed in terms of their dynamic properties. In Chapter IV, dynamics of e-business infrastructure illustrates the contingent approach to infrastructure services depending on an e-business model. As the chosen e-business model increases its number of IT infrastructure services, the e-business model capability improves.

Next, the dynamics of knowledge management systems in Chapter V presents the stages of growth model for knowledge management technology and discusses technology stage dynamics. For example, as the organization has implemented advanced expert systems at a higher stage, it might be necessary to return to a lower stage to create the information resources needed to apply such systems more effectively.

Then in Chapter VI, one more important IT management topic is presented and discussed as a dynamic phenomenon. The chapter is concerned with IT outsourcing relationships. We have learned that relationships both deteriorate and improve, depending on a variety of factors. When the influence of these factors and the interactions between these factors are studied over time, we find yet another interesting example of business dynamics in IT.
The selection of IT management topics is not random. Rather, the selected topics emerge as important to most organizations toward 2010. The selected IT management topics are IT governance, e-business, knowledge management, and outsourcing.

In Chapter VII, we returned to the firm perspective as introduced in Chapter I. While Chapter I had an organizational focus on resources and value configurations, Chapter VII is focused on the role of management in strategy development and implementation. The resource-based theory is further development in terms of resource-based strategy. Again, business dynamics in IT management is illustrated by causal loop diagramming and reference mode behavior.

Chapter VIII presents the CIO, who is responsible for the IT function in the organization. The perspective of business dynamics incorporates CIO influence and performance in causal relations, together with the performance of the CEO.

So far, all chapters have studied dynamics of IT management. In Chapter IX, two organization examples illustrate knowledge business performance. Here, IT management is a factor, but not the only one. The first example of law firms as knowledge-intensive businesses presents knowledge categories and knowledge levels. The next example of police investigations as part of law enforcement presents knowledge work in investigation value shop.

Finally, in Chapter X, dual MIS topics are presented. First, knowledge management systems and e-business are linked in a dynamic perspective. Next, knowledge management systems and IT outsourcing are linked in a dynamic perspective. These two examples should further illustrate business dynamics in IT. Not only is IT over time interacting with business and firm performance, but there are also dynamic relationships within different aspects of IT.

The material put together in this book serves the purpose of helping the reader study IT from a dynamic, rather than from a static, perspective. By introducing two simple tools from system dynamic modeling—causal loops and reference modes—the dynamic perspective might become the most important to both students and practitioners in the future.

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