

# Preface

*Let no one despise symbols!, Without symbols we could  
scarcely lift ourselves to conceptual thinking.*

Gottlob Frege, *On the Scientific Justification of a Conceptual Notation*, 1882

Business processes are the core of organizational activities, both in private and in public sectors. A (*business*) *process* is a collection of related, structured tasks that produce a specific service or product to address a certain (organizational) goal for a particular actor or set of actors. Owing to its increasing importance, the management of business processes is receiving increasing interest. Business process management (BPM) generally focuses on how work should be performed in and across organizations to ensure consistent outputs by taking advantage of improvement opportunities—e.g., reducing costs and carbon footprint; ensuring socially responsible actions, execution times, or error rates; or improving the quality or service level.

An important area of BPM is the modeling of processes—business process modeling—which is what this book is about.

So why this focus on modeling?

One can argue that the main reason why humans have excelled as a species is our ability to represent, reuse, and transfer knowledge across time and space. Whereas in most areas of human conduct, one-dimensional natural language is used to express and share knowledge, we see the need for and use of two- and multi-dimensional representational forms to arise. One such representational form is called *conceptual modeling*. A *conceptual model* is historically defined as a description of the phenomena in a domain at some level of abstraction, which is expressed in a semiformal or in a formal diagrammatical language. Business process modeling is a special type of conceptual modeling.

In business process modeling, a mature practice has recently been established around the more formal aspects of the processes necessary for the development of executable models. In many areas, however, although much work has been done,

we still have not developed a common agreement relative to central notions—either in research or in practice. In particular, we can mention differing opinions and inputs on, for example:

- Quality of business process models, so they can be used to achieve their purpose,
- Appropriate modeling formalisms and extensions of modeling formalisms and approaches to support achievement and maintenance of model quality,
- Needs for tools and methods to support different approaches to process modeling.

Business process modeling is usually accomplished in some organizational setting but for a myriad of usage areas, including human sense-making, communication, simulation, activation, quality assurance, compliance management, and context for systems development.

Given that modeling techniques are used in such a large variety of tasks with very different goals, it is important to appropriately use the techniques to achieve a proper overview of different uses of modeling and guidelines for what makes a model sufficiently *good* to achieve the decided goals. A main purpose of this book is to discuss how to achieve quality in business process models.

To address issues of the quality of conceptual models in general, we have for many years worked with SEQUAL, a framework for understanding the quality of models and modeling languages, which can subsume all main aspects relative to the quality of models.

SEQUAL has three unique properties compared with other frameworks for model quality:

- It distinguishes between quality characteristics (goals) and means to potentially achieve these goals by separating what you are trying to achieve from how to achieve it.
- It is closely linked to linguistic and semiotic concepts. In particular, the core of the framework—including the discussion of syntax, semantics, and pragmatics—is parallel to the use of these terms in the semiotic theory of Morris. A term such as “quality” is applicable to all semiotic levels. We include physical, empirical, syntactical, semantical, pragmatic, social, and deontic quality in the work on SEQUAL.
- It is based on a constructivist worldview, recognizing that models are usually created as a part of a dialogue between those involved in modeling, whose knowledge of the modeling domain changes as modeling takes place.

A limitation of SEQUAL is that it can be too abstract because it is meant to be able to support the discussion of the quality of all sorts of visual models and modeling languages and thus is difficult to apply in practice.

In this book, we specialize SEQUAL to investigate the quality of business process models. By starting from a generic framework, we can reuse a number of

aspects that have general relevance in modeling and thus better ground the proposals—for both the quality of business process models and modeling languages and the accompanying approaches, methods, and tools—to achieve and maintain models of high quality.

A large body of literature has been developed on business process modeling and business process management. The existing works address only a limited set of the usage areas of modeling, whereas this book covers the whole spectrum of modeling goals to find balance in practice by achieving the optimal quality of the process model developed. Some of these usage areas have become popular only recently, thus warranting an update of the coverage of the area with a focus on how to balance quality considerations across all semiotic levels when models are used for different purposes.

## **Audience**

This book has two intended audiences:

- It is primarily for computer science, software engineering, and information systems students at the postgraduate level (master/PhD), after they have been introduced to information systems analysis and design (e.g., based on UML or BPMN), who want to know more about business process modeling and quality of models in their preparation for professional practice.
- Professionals with detailed experience and responsibilities related to the development and evolution of process-oriented information systems and information systems methodology in general who need to formalize and structure their practical experiences or update their knowledge as a way to improve their professional activity. This book includes a number of case studies from practice that will make it easier for practitioners to grasp the main theoretical concepts, of this book helping in the application of the approaches described.

At this level, many students have learnt modeling as a predefined tool and have limited training in evaluating the appropriateness of models and modeling languages to achieve a specific goal. They also have limited practical experience with more than a few notations and seldom have real-life experiences with large-scale modeling and systems development. Many of the concepts and principles underlying the concrete modeling notation easily become abstract, and there is a need to exemplify the points and bridge the theoretical parts of the course in terms of how it can address problems in practice, which is also an important takeaway for practitioners as described above.

## Outline of This Book

Chapter 1 contains the theoretical foundation by introducing the topic area of business processes and business process modeling and the most important concepts underlying the modeling of business processes. The thinking is grounded in general model theory and highlights the overall philosophy underlying the approach to the quality of models by providing a high-level overview of the most important goals of modeling. We also exemplify this by introducing some of the cases and modeling notations used later in this book.

Chapter 2 describes existing work on the quality of models including SEQUAL and covers in particular work on the quality of business process models.

Chapter 3 describes a specialization of SEQUAL for the quality of business process models including examples of means to achieve model quality at different levels.

In Chap. 4, we provide examples of the use of business process models in practice. We present results from detailed case studies evaluating how to achieve and maintain quality in business process models and how to choose and/or make appropriate business process modeling notations to achieve this goal.

Chapter 5 presents a process modeling value framework: Whereas most modeling approaches (and methodologies) are related to development projects for single information systems, in this chapter, we will discuss how one can achieve a more long-term and improved return on investment of using (business) process and enterprise models. We will then consider how more specific techniques for business process modeling can be applied in this setting (such as tool functionality, use of reference models and modeling techniques, and notations appropriate for the development of high-quality models).

Chapter 6 contains a summary of the main content of this book and discusses the potential for business process modeling in the future through integration with other types of modeling, attacking a new set of challenges particularly across organizational borders to support digital ecosystems based on open big data and systems of systems.

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