Introduction

Part 1 deals with product line management, which covers the fuzzy front end of creating a product line during which software-intensive product companies need to build product roadmaps that initially define the intended set of products and targeted markets for the line, the intended commonalities and variability for the products, a schedule for bringing the products to the markets, and legacy systems and other artifacts to be considered when defining software product line requirements. Product line management also covers the management of the organizational change process where product line engineering and management culture is institutionalized in organizations.

Part 1 consists of three chapters:
- Chapter 1. A Scenario-Based Method for Software Product Line Architecting
- Chapter 2. Strategic Scenario-Based Valuation of Product Line Roadmaps
- Chapter 3. Experiences and Expectations Regarding the Introduction of Systematic Reuse in Small- and Medium-Sized Companies

Software product line engineering implies making a long-term investment in a common software product line architecture to support the derivation of potentially many generations of products in the line. Short-term and long-term business considerations should be well balanced when defining and evolving software product line architectures. Established methods for architecting lack support for doing this in an efficient manner.

Chapter 1 presents a scenario-based architecting method to address this problem. The method uses various types of scenarios to ensure that the long-term future is taken into account and to enable the efficient description, evaluation, and comparison of multiple candidate architectures in parallel. Chapter 1 also serves as an excellent introduction to this book as it takes a holistic view on product line engineering and management to an extent seldom seen in academic product line literature. Its perspectives range from considering market needs and business strategic issues to product line implementation using available technologies. Only product line testing is strictly outside the scope of the chapter.

The business case for the long-term investments in developing the architecture, setting up the organization, and developing engineering and managerial skills has to show that the expected outcomes ranging from reductions in time-to-market to increased development efficiency and improved quality outweigh the investments when economical criteria are applied. Models exist for evaluating the impact of product line engineering on development cost. But revenues, lifecycle costs, time, and uncertainty must also be accounted for in assessing the economical value. More comprehensive economical models
are thus needed to base product line roadmap decisions on valid assessments of the expected economical outcomes.

Chapter 2 complements the scenario-based architecting method by introducing a general model for evaluating the value of investments made in product line engineering to evaluate the expected economical values of scenarios for product line architecture development. To address assumptions and expectations about the future, the model uses strategic scenarios and assigns each of them a probability. Chapter 2 also combines the general model and previously available models into a single comprehensive framework covering all factors in the equation of economical value for product line engineering.

All software reuse initiatives have encountered similar organizational, managerial, and knowledge-related problems in the organizational implementation of software reuse techniques. Organizations thus need effective solutions to face these problems. Chapter 3 provides insights into what are the reuse opportunities and the problems organizations confront when implementing systematic reuse initiatives. It addresses organizations that are considering implementing a systematic software reuse initiative and wish to have an idea of what other organizations have undergone, how they have resolved problems encountered, and what is the expected evolution of the initiative.

The chapters of Part 1 complement each other in many ways. Most importantly, they recognize that, from the technical viewpoint, the maturity of the techniques and mechanisms for implementing systematic software reuse is considerable but the software product line initiatives often fail due to managerial, economical, and organizational challenges. Solutions to these challenges are scarcely available in the literature. Yet, they are critical to successfully launch software product lines in industrial settings. Therefore, the managerial and economical perspectives of software product line engineering taken in Part 1 are especially justified. All chapters rely on empirical experiences from the industry.