

Preface

Context

Modern society is fundamentally dependent on highly complex *infrastructures*. Examples of infrastructures include energy distribution, transportation systems, communications networks, financial services, governments, the military, airline reservation systems and traffic control.

All of these infrastructures depend in one way or the other on *information systems*. Information systems are mission-critical. A malfunction or failure of the system partly or totally inhibits the operation of the infrastructure. Such malfunctions or failures can potentially cause damage, chaos, loss or serious disturbances.

Many of these systems belong to a special class of systems, introduced in this book: The *very large information systems*. They have some common main characteristics: They consist of a large set of rich functionality and are exposed to a continuous flow of new requirements, resulting in a high rate of change. Typically, very large information systems have grown over decades and as a consequence

"It is generally agreed that increasing complexity is at the heart of most difficult problems facing today's systems architecting and engineering"
Mark W. Maier, Eberhardt Rechtin, 2002

have accumulated significant portions of so called *legacy parts*. As a result, very large information systems exhibit massive and increasing *complexity*. This

is the cause of many problems in adapting, evolving, maintaining and operating these systems. Unfortunately, the need to continuously add new functionality, to adapt to new technology, to serve additional locations, absorb growth and to add more users to the systems inevitably increases complexity.

Challenge

Driven by user, technology and market requirements, very large information systems must continually be transformed to ensure the competitiveness of the *business* they serve. In spite of a high rate of change the systems must at all times guarantee the desired quality attributes, such as stability, availability, dependability and security. Deficiencies or failures in such non-functional areas may seriously damage the business. In addition, the continuous aging of the system results in obsolescence of parts of the system. Such legacy parts resist modifications, are expensive to maintain, eventually reach the end of their lifecycle and must therefore be replaced.

An economic requirement is the need for continuously improving the *efficiency* of the system: The cost and time to market for the implementation of new functionality as well as the operational cost are under constant pressure.

The development of very large information systems covers implementing new requirements on time and budget, managing system complexity and reducing development and maintenance cost – all at the same time. This is a demanding task incurring considerable risk. Today it can often be observed that organizations tackle these challenges by developing the very large information systems opportunistically. In an *opportunistic approach* the two drivers for investments are new business requirements and the promise of new technologies. Very often the need to take proper care of the existing system is disregarded. The continuous addition of new functionality and new technology leads to ever growing *complexity*. This approach inevitably leads into the *complexity trap*. The very large information system becomes inflexible, costly and unreliable. It no longer fulfils the stakeholder expectations. The system reaches a dangerous dead end. The resulting questions are: Is there an alternative? Which is the adequate strategy for very large information systems?

The Message in This Book

This book shows one proven way to meet the challenges of the development over time of mission-critical, very large information systems that include significant legacy parts. It takes the reader from the analysis of the issues of very large information systems to an assessment of the different strategic approaches. The recommended strategy, in the experience of the authors, is *Managed Evolution*. Managed evolution leads to a continuous improvement and sustainable lifecycle evolution of very large information systems. It also improves *agility* in the form of reduced time to market and lower cost for adapting to new requirements. The elements and the implementation of this strategy, including the main processes, instruments and metrics are described in this book.

The authors believe that managed evolution is applicable to any very large information system. The reason is that all very large information systems obey the same laws: Requirements growth, structural decay, technology obsolescence and growing complexity lead to quality, efficiency and cost challenges. The experience of the authors is based on work with very large information systems in the financial industry, an early adopter of information technology. In their opinion, these concepts will become relevant to other industries that adopted information technology later.

All the recommendations, conclusions and findings about managed evolution are based on the experience of the authors with this approach. The approach has been successful over more than a decade for a very large information system in the financial services industry.

Side-Stories

Modern financial institutions use *information systems* to deliver their services to customers. Transactions in most cases happen electronically and not physically anymore. The assets have largely been converted to “bits in Information systems”. This development has left financial institutions heavily dependent on their information systems.

“Today’s banking operation consists mostly of managing and moving data about money”

The managed evolution approach documented in this book has been developed and applied by the authors at Credit Suisse¹, a global bank. Some key practical results mainly from Credit Suisse are used in this book as *sidestories* to illustrate important concepts.

Intended Audience

This book is a management book, not an engineering text and not a banking story. It

“Poor architecture creates a litany of problems, including:

- Redundant applications, processes, and data
- Needless IT rework
- Redundant hardware and software (Infrastructure)”

David Marco, 2004

explains the added value delivered by the managed evolution of very large information systems compared to other strategic approaches. The

intended audience of this book is: Managers and IT architects who deal with very large information systems from a strategic perspective, developers and project

¹see <http://www.credit-suisse.com> for more information.

managers who perform work on such systems and business managers who want to understand how the long term evolution of their systems impacts their business and its future.

Structure of the Book

The book contains four parts:

- Chapters 1–4 introduce structure, properties, challenges and architecture of very large information systems. The focus is on the *system*, including system analysis, system architecting and system engineering with respect to managed evolution,
- Chapters 5–7 focus on the *organization* behind the very large information system. This includes business-IT alignment, people, culture, organization and measurement for the successful execution of managed evolution,
- Chapter 8 summarizes and concludes the book with an outlook.
- Finally references are listed, a glossary and a list of abbreviations of the most important terms are provided and an extensive index concludes the book.



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Managed Evolution

A Strategy for Very Large Information Systems

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