
SERVICE ENTERPRISE INTEGRATION

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An Enterprise Engineering Perspective

Edited by

Cheng Hsu

Rensselaer Polytechnic Institute

Dedication

*Dedicated to our colleagues,
who made research rewarding*

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Preface

One could argue that service is ultimately based on knowledge, and knowledge on the interaction between human and information resources. A significant phenomenon is, information resources exhibit a propensity to connect with each other especially when they are digitized. Evidence is manifested in the evolution of enterprise databases, peer-to-peer applications on the Internet, and the Web world itself. One would be tempted to liken the connection to the formation of galaxies, stars, and planets from the basic elements of the universe. The “gravitational pull” in the case of digital integration seems to be the utility of connection, or, the economy of scale of digital resources. Therefore, service seems to be poised to not only reap the benefits of Information Technology as manufacturing does, but also to enjoy more economy of scale than manufacturing can, since the latter is constrained by physical materials when it comes to connection.

However, the service sector of the economy has long lagged behind manufacturing in productivity gains from computerization. This presents an unfortunate problem since our economy is increasingly based on services. The root cause is commonly attributed, ironically, to the lack of economy of scale for service (co-)production. Its justification seems to rest on the difficulty of standardization of knowledge workers and other production factors for services; as compared to what manufacturing has achieved since Industrial Revolution – e.g., standard parts, bills-of-materials, and machining processes. However, standardization does not have to be the only mode that allows for large scale production. For instance, we submit that connection gives scale and sharing yields economy. Therefore, services could possibly enjoy economy of scale by, e.g., exploring new modes of production.

In a general sense, many researchers believe that when service and manufacturing both rely on information technology for their production, then what happened to one due to IT should have a way to happen to the other. To explore this conviction, a common approach in the field is to identify the IT-enabled generic results of manufacturing enterprise engineering and apply them to service enterprises. Modifications and new results would then be figured out to accommodate the differences between these two genres. In addition, new thinking is possible and, perhaps, desirable.

The contributors of the book have developed their answers to the service productivity question. Some of the results analyze the field; some others propose new models and methods; and yet others represent new thinking and new approaches. They constitute a literature of service enterprise engineering. We briefly summarize these results below.

Chapter 1, by Ananth Krishnamurthy, analyzes the literature and thereby sets a corner stone to the book. The author reveals the scientific road from on-demand manufacturing to on-demand services. He examines Just-in-Time manufacturing and mass-customization, and shows that manufacturing shares some common problems with service, such as portfolio optimization, workflow optimization, and resource allocation. Strategies are suggested for engineering on-demand services from these established results.

Chapter 2, by Jim Tien, provides a bold step forward to analyze service innovation. The author establishes a comprehensive conceptual framework which promises to help an enterprise transforming itself in a growing knowledge economy. The model theorizes six decision-oriented attributes of service innovation and normalizes nine enablers and four drivers of innovations. The Decision Informatics paradigm is established to be a key enabler. Future spaces of innovation are suggested.

Chapter 3, by Francois Vernadat, presents a particular service enterprise engineering approach. The author, an expert in manufacturing, explores the combination of agile inter-operable enterprise systems with more traditional business processes as a way to re-engineer legacy organizations and thereby enhance an orientation in service. He also reduces the concept to practice in an actual case under the auspices of European Union, concerning especially the aspects of enterprise engineering and IT implementation.

Chapter 4, by Jian Chen and Nan Zhang, manages customer expectation on waiting time. The authors first review the customer incentive issues that are related to waiting time in services. A tutorial covering such basics as the micro-economic concepts of firms and a customer's utility function is offered. A detailed analysis of the technical literature is then presented as the main focus of the chapter. Finally, the authors discuss some new ideas toward the design of new optimal incentives.

Chapter 5, by Juong-Sik Lee and Bolek Szymanski, proposes a new pricing mechanism for e-services. The authors analyze that many e-service markets exhibit recurring auctions and other unique characteristics which make the prevailing methods of auction today unable to achieve the best efficiency for the market. Instead, they develop a novel Optimal Recurring Auction model and prove through simulation that the ORA model works better under certain market conditions.

Chapter 6, by Mark Dausch, develops strategic service products for manufacturers. The author shows a particular reference framework of service enterprise integration to help manufacturers transforming their traditional business of producing physical products. Traditional product services are developed into strategic products in and of themselves. A particular industrial case is analyzed to illustrate the methodology in action. The work also represents a link between traditional manufactures and service.

Chapter 7, by Ming-Chuan Mike Wu, evaluates information services. The author focuses on the evaluation of new Information Systems and Information Technology projects, and analyzes the issues that traditional methods such as Return on Investment fail to address properly. He develops a "Continuous Evaluation" model to facilitate the well-known problems of uncertainty; and employs a generic reference framework to comprehensively account for possible organizational benefits.

Chapter 8, by Cheng Hsu, explores productivity issues of knowledge economy. The author postulates that new cyber-infrastructure could provide optimization of value to person and economy-of-scale to enterprises. With the notion of an Output-Input Fusion paradigm, he suggests a framework of concurrent co-productions using concurrent virtual configurations of the new cyber-infrastructure. Computerized manufacturing and e-commerce/e-business are reviewed as harbingers, along with a research agenda.

On a personal note, as the editor of the book, I must confess my pride in these chapters. The contributors have presented some of the truly original and thoughtful works on the subjects addressed, which add to the scientific field. In my opinion, these results represent some of the best analyses available today. Interestingly, although all contributors developed their chapters completely in their own choice and control, their results nonetheless exhibit considerable mutual consistency. They show common philosophy towards service, compatible analyses of service, and complementary basic approaches to service enterprise engineering. Could we take this coherence as evidence of a scientific foundation to a discipline of services?

Cheng Hsu

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Many colleagues have provided assistance to the book. Foremost are, naturally, the contributing authors. I wish to express my deep appreciation for their acceptance of my personal invitations to participate, and contribution of their quality works to the book. The book idea was originally inspired by a meeting between the Decision Sciences and Engineering Systems Department of Rensselaer Polytechnic Institute (led by Dr. Jim Tien, chairperson) and a team from the IBM (led by Ms. Linda Sanford, senior vice-president) in 2005, concerning on-demand business. Mr. Gary Folven, the senior publisher at Springer, and the reviewers of the book proposal helped solidify the book idea. I wish to express my sincere gratitude to all of these colleagues. Finally, I am indebted to Mr. Anuj Goel who provided expert assistance to compile the book.

