
ENTERPRISE COLLABORATION

ENTERPRISE COLLABORATION
On-Demand Information Exchange for
Extended Enterprises

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Dedication

*This book is dedicated to our
families*

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Preface

Global supply chain is a fact of life in today's world. From the perspective of the First World, this practice reigns in outsourcing of jobs that, in the view of many, threatens a way of life. This argument actually implies that outsourcing represents a fair chance for the Third World to catch up and reverse-leverage through market economy. However, many in the Third World are also opposed to the global market economy from an opposite argument. The fact that matters is, of course, that globalization continues to progress relentlessly in its own momentum, and that the national playing grounds continue to level globally for both Worlds. Would globalization results in the rich nations getting richer and the poor poorer; or would it help the world united in the same economical reason?

The questions that we the researchers could try to answer are a different kind, the kind that leads to the understanding of the elements of "the fittest" in the global competition. For instance, what defines an enterprise's staying power on the top of the food chain, or an economy's ability to design and control the global supply chains, in the long term? Evidently, to understand this ability the field needs to study the engineering prowess required, as much as the finance and management if the history of industrial revolution is any guide. Yet, the study on the engineering of global supply chains has been largely lacking. Traditional enterprise system engineering methods and information technology do not automatically scale up to the massively extended enterprises that global supply chains entail. As a prime example, from the perspective of this book, the problem is illustrated in the limited practice of real-time information exchange across the supply chain – i.e., the field lacks some key elements to enable an enterprise drilling through all tiers of suppliers to coordinate the global schedules. Without this

ability, supply chain management would have to rely on managerial control, which is inherently off-line and limited by the manual span of control.

We set out to develop real-time information exchange for massively extended enterprises in the book. Our work started with a simple question: Why the traditional results for global query of autonomous databases do not work sufficiently for supply chains? To answer the question, we draw heavily from our past work on information integration in manufacturing enterprises; that is, we examine the requirements of supply chains in the context of the evolution of enterprise integration, with an ever expanding scale and scope. In this context, we examined the limits of the previous Global Database Query results and the promises of the new extended enterprise approaches, especially the software agent-based methods and the market-style resource allocation models. We realized that the key issues include the independence of the participating databases in the participating enterprises of the supply chains; and that this issue logically extends the previous paradigm of enterprise integration into a new one of enterprises collaboration. The previous paradigm is proven in manufacturing, while the new one is promising for supply chain integration (and indeed, for that matter, in any other similar domains of enterprises collaboration).

It follows, then, that we can formulate a new model which retains the traditional Global Query results, along with their proven promises, to address the new domain for what they can and do best, and devise new attending methods to handle the rest in a synergistic manner. This approach leads to a Two-Stage Collaboration Model, where the first stage, which is new, matches the independent databases for their information provisions and requests in a market-style design, while the second, which is based on proven results, processes the matched, resultant global queries.

The new solution allows enterprises to safely contribute their production databases to collaboration, such as in a supply chain information exchange regime, without having to succumb to an intrusive control model, which has traditionally inhibited the enterprise databases from participating in the collaboration. The solution also supports enterprises to contribute multiple images or personalities of their databases to multiple concurrent collaborating endeavors, as well as to only one. This property attends to the many-to-many relationship between suppliers and supply chains – i.e., the fact that suppliers often sell to more than one buyer or prime. These results distinguish the new model in the field.

In a more general sense, beyond supply chain per se, the new model provides a high-level concept where information owners and seekers collaborate in an economic market to exchange information and facilitate each others' enterprises. The economic paradigm allows participants to choose with whom to trade, and to also define the terms of the

transaction. Accordingly, databases denoted as data providers will not only publish the resources to be shared, but in contrast to traditional global query solutions, also proactively select data subscribers that are looking for information that the databases contain. The economic market works towards self-allocation or self-regulation of resources for optimal global utilization. In the general context, the present work holds promises for application domains that employ database query-level information fusion and on-demand exchange of information resources.

In summary, the book analyzes the evolution of Enterprise Integration from the perspective of the Two-Stage Collaboration Model, and reviews the related results in the literature. Supply chain integration provides a context for these discussions. A general agent-based conceptual model is then developed to usher in the main result of the book. On this basis, the rest of the book is devoted to the complete development of the Two-Stage Collaboration Model. The first stage is analytically justified on its computing performance and unique properties, vis-à-vis the previous results in the fields of matchmaking and global database query. A prototype and laboratory testing are also included to illustrate the technical feasibility and soundness of the new model.

The book is based on David's unpublished dissertation at Rensselaer Polytechnic Institute, Troy, NY 12180-3590, with substantive revision and extension.

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