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著者(和文)	劉楊
Author(English)	YANG LIU
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Business Process Change Analysis and Business Process Simulation in the Context of Enterprise Engineering

Yang Liu

Supervisor:
Professor Junichi Iijima

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Graduate School of Decision Science and Technology

Tokyo Institute of Technology

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ABSTRACT

To respond to and to defeat their competitors, an organization must analyze their business processes and improve or change them to become more agile, efficient and effective. Sometimes, after an organization has carefully re-designed their business model, vision, and mission, their business processes must be quickly restructured to support these upper-level changes. However, contrary to their plans, the author sees high failure rates in many real-life business processes due to re-design and reengineering.

These high failure rates are caused by limitations in the traditional workflow perspective of business processes and limitations in the research methods used to support these changes. The workflow perspective places too much emphasis on details without a broad and high-level perspective; therefore, while this method can address the "how to" question, it is less capable of answering the "why" and "what is required" questions. Moreover, most business process modeling methods are aimed at developing information systems instead of business process changes. The separation of modeling and simulation makes these models weak at describing large and complex systems; they are also not very effective for supporting business process changes.

To solve these problems, the author investigated a more effective methodology to support business process change analysis. Enterprise engineering provides us with a different organizational perspective that considers an enterprise not as a set of separated workflows but as a complete coordinated system. Using this concept, the author introduced a new perspective and a corresponding method in order to analyze enterprises for improvement, reengineering or transfer. The new method analyzes enterprises from a new perspective to answer the "why", "what is required" and "how to" questions. The new method also seeks to combine modeling and simulation to provide an executable and measurable model and simulation framework that enables to describe large and complex systems and is modularized to support these changes and the 'to-be' simulation. The outcome of this research can be described in three parts.

- **How to analyze:** The first part is a qualitative research framework for analyzing business process changes; this part of the research explains how the author can consider construction changes in the context of enterprise engineering. The nine proposed types of changes are guidelines that can be used throughout this research.
- **How to simulate:** The second part is a simulation framework that includes a conceptual modeling method and libraries that can be reused to analyze business process changes via calculations, comparisons, and evaluations. The proposed DEMO++ (expanded enterprise ontology) includes both ontology model and implementation model that can be used as a conceptual modeling method for business process simulations.
- **How to apply:** The third part is an application of the proposed methodology in practice.

Compared with traditional workflow-based business process modeling and simulation methods, the enterprise engineering-based DEMO++ method is not only a simulation method but also an analysis method. This method can be well integrated with management to analyze problems, seek solutions and evaluate alternative plans for enterprise reengineering. In the context of enterprise engineering, DEMO++ provides more capabilities than simulation alone. It is better at analyzing and simulating complex business processes and collaboration activities, which other traditional simulation models cannot adequately support. Moreover, this method is a modularized, component-based simulation model with increased reusability, changeability and flexibility.

Another contribution of this research is practical. By clarifying the differences and dependencies between ontological and implementation models, our methodology was used to develop a generic framework for generating modularized, component-based simulation models with increased reusability. The proposed components were developed as an AnyLogic DEMO++ library, which can be reused in other DEMO++ based simulations.