1.3 MODELING FOR VIRTUAL ORGANIZATIONS

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The development of virtual organizations, but also their introduction in practice requires models depicting the concepts and supporting communication and understanding. Most research and development projects for virtual organizations have focused on modeling for system design and used related models and tools. However, these approaches are not well suited to capture the underlying VO business architecture and concepts resulting in less progress in this field. This chapter discusses a broader spectrum of modeling approaches from management-oriented, conceptual models to system design and enactment. It proposes a staged modeling process both for practical VO implementation and for research and tool development. This approach should support advancing the conceptual, technical and practical state of the art in the virtual organization domain.

1. INTRODUCTION

Virtual Organizations can take a broad variety of different forms such as collaborative supply chains, project organizations or networks of small and medium sized enterprises. They all employ some characteristics of virtual organizing to gain competitive advantage as outlined in the previous chapter:

- Combination of competences and resources from different partners (Integrative Atomization)
- Project-oriented organization with fast recombination of partners, roles and processes (Temporalization)
- No legal or other formal structures (Dematerialization, Non-institutionalization)
- Geographically dispersed working (Delocalization)

Usually, the search or need for agility and innovation (Goldman, Nagel et al. 1995; Walker, Kogut et al. 1997) are the main drivers towards more virtual or networked organizations – implying that they need to constantly readjust to changing business requirements. But despite the potential flux, some organizational design has to be done and made explicit. Modeling is a very suitable means to aid designing, communicating, and implementing virtual organizations.
Managers wanting to introduce a virtual organization or are operating in them require models especially for understanding and communication. Since different partners with different ideas and mental models come together in a VO, they need a common basis for discussing and negotiating structures and processes, and also for training the people operating in them. In the future, models might even directly drive transactions and workflows in model based IT systems, allowing faster changes in processes.

Researchers and designers developing tools and methods for virtual organizations require blueprints of organizational architecture and processes as basis for their work. Models help to make assumptions explicit and allow evaluation and comparison of different forms of virtual organizations as well as of the solutions developed.

The objective of the chapter is to present modeling approaches for the design and implementation of virtual organizations and for developing tools and methods for them. Other applications such as modeling for analyzing specific organizations or for detailed software design and interoperability support require different models (e.g. graph models, entity relationship diagrams), even though researchers and developers working in these fields should also consider especially the architectural and process models presented here as first steps for their work.

The chapter is structured as follows: the next section introduces the research method used for deriving the methods and recommendations presented in this chapter, followed by a short general introduction to models and purposes for modeling. This provides a framework for the different modeling approaches portrayed in the subsequent section. A critical analysis of the approaches used in business implementation and European research projects are the basis for recommending a practical process for modeling in these contexts, but also for suggesting future work to advance modeling methodologies.

2. RESEARCH METHOD

The authors have reviewed various modeling methodologies and models proposed in the literature. This was the basis for a semi-structured questionnaire on modeling methods employed, models developed, and experiences from the modeling process. The questionnaire was used in a survey among 29 research projects funded by the EU IST program with 22 valid questionnaire returns. The other projects did not pursue any modeling activities. Additionally, the projects provided project overviews, publications, and reports and allowed clarification of any issues through telephone interviews.

Further, about 100 papers on virtual organizations presented at the ICE-conferences 2001, 2002 and 2003 and at the PRO-VE-conferences 2002 (Camarinha-Matos 2002) and 2003 (Camarinha-Matos & Afsarmanesh 2003) were evaluated regarding their modeling approaches and related model results.

Additionally, the authors have first hand practical experience in the development and implementation of about ten virtual organizations, which allowed a critical reflection of the literature review and survey results, as well as the suggestion of tested modeling approaches.