Chapter 4
Understanding Business Domain Models:
The Effect of Recognizing Resource-Event-Agent Conceptual Modeling Structures

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ABSTRACT

In this paper, the author investigates the effect on understanding of using business domain models that are constructed with Resource-Event-Agent (REA) modeling patterns. First, the author analyzes REA modeling structures to identify the enabling factors and the mechanisms by means of which users recognize these structures in a conceptual model and description of an information retrieval and interpretation task. Based on this understanding, the author hypothesizes positive effects on model understanding for situations where REA patterns can be recognized in both task and model. An experiment is then conducted to demonstrate a better understanding of models with REA patterns compared to information equivalent models without REA patterns. The results of this experiment indicate that REA patterns can be recognized with minimal prior patterns training and that the use of REA patterns leads to models that are easier to understand for novice model users.

INTRODUCTION

The Resource-Event-Agent (REA) enterprise information architecture (Geerts & McCarthy, 2002) is a consensually agreed and theoretically-founded ontology for enterprises that is used as a conceptual modeling framework for enterprise information systems (Dunn, Cherrington, & Hollander, 2005; Hruby, Kiehn, & Scheller, 2006). An ontology is an explicit specification of a conceptualization: the objects, concepts and other entities that are assumed to exist in some area of interest and the relationships that hold among them (Gruber, 1993). Whereas general-purpose

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conceptual modeling languages (e.g., UML) do not prescribe which objects, relationships, and properties to include in models of some domain, a domain ontology identifies the objects of interest in the domain and offers rules to connect these objects into information structures.

The concepts and structures of the REA ontology are presented as a collection of modeling patterns. Analysts can use the templates that document these patterns as a base solution when creating models. Model users can use the patterns as a reference when reading models and trying to understand them. In this study, we examine the structuring capabilities offered by the REA patterns and their effect on the conceptual modeling outcome. Prior research indicates that the use of REA patterns helps in creating more accurate conceptual models (Gerard, 2005), which is important given that information systems are developed based on such models (Olivé, 2007). Conceptual models are, however, also used to help understand phenomena of interest within a domain and to support the communication between users, analysts and developers (Wand & Weber, 2002). The benefits of using patterns for understanding models have not been thoroughly explored. Therefore, we investigate whether recognizing REA conceptual modeling structures improves model understanding.

The second section of the paper provides an introduction to the REA ontology, presents its core structuring principle, i.e., the resource-event-agent pattern, and explains its use in constructing domain models of business processes, thereby defining the type and scope of the conceptual models to which this research applies. The third section reviews prior research and further refines the research question. The fourth section proposes a research model that is based on the premise that users who interact with REA-based conceptual models recognize the resource-event-agent structures. Accordingly, hypotheses are developed based on pattern recognition theories from cognitive psychology. The fifth and sixth sections present the design and conduct of an experiment to test these hypotheses and the analysis of the collected data. Finally, the seventh section presents conclusions, discusses the study limitations and the implications of the research findings, and outlines further research directions.

THE RESOURCE-EVENT-AGENT ONTOLOGY

The REA ontology has been accepted in August 2007 as the international ISO/IEC standard 15944-4, referred to as the Open-edi Business Transaction Ontology (OeBTO). Different reference models and methodologies for designing business services in e-collaboration contexts (e.g., the UN/CEFACT's Modeling Methodology (UMM), the E-Commerce Integration Meta-Framework (ECIMF), the ISO/IEC 14662:1997 reference model for electronic data interchange) use REA as underlying business ontology for grounding the constructs of their modeling formalisms.

Alternative ontologies for the same domain may differ because of the lens through which they look at reality and that determines their domain conceptualization (i.e., the domain concepts that they consider relevant). The basis of REA is the semantic data model for accounting proposed by McCarthy (1982). REA thus focuses heavily on those enterprise concepts that are required to implement accountability and control principles. The conceptualization of an enterprise specified by REA is that of a chain of interconnected transaction cycles that all contribute to the generation of 'value' for the enterprise. Each transaction cycle is an aggregate of (usually two) business processes that effectuate either market exchange transactions or internal conversion operations. An example of the former is the revenues cycle, which integrates sales and collection processes (i.e., the order taking and delivery of a product or service and the collection of the payment make up a 'cycle'). An example of the latter is the production cycle,