

Resource-Event-Agent-Unit

an ontology for sharing sensitive transaction data

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Abstract. This paper introduces a slightly divergent interpretation of the REA ontology, which will be called REAU. REAU's main objective is to serve as an intermediary between REA's dependent and independent view. As the independent view was designed for EDI, and the dependent view for accounting, the main idea is to enable an automatic transformation between both views that published unclassified transaction data required for collaboration between trading partners and filters classified transaction data required for accounting. The main goal is to present a fully functional proof of concept in Prolog at the VMBO workshop.

Keywords: Resource, Event, Agent, Unit, REA, ontology, business ontology, enterprise ontology, dependent view, independent view, helicopter view, trading partner view, interoperability.

1 Introduction

Businesses collaborate with partners to create value and compete with those same partners to earn the largest part of this value. (Brandenburger & Nalebuff, 1996) Collaboration requires sharing information with trading partners, whereas information sharing might hamper maximization of earnings in a competitive environment.

This paper introduces an ontology that is able to both represent in a single format all information that is useful for trading partners and all information intended only for members for the organization, while allowing for the protection of strategic data and the publication of public data in a format suitable for trading partners.

Given the existence of a dependent (enterprise-centric) and an independent (supply-chain centric) view, the Resource-Event-Agent (REA) ontology has been chosen as the foundation for the sharing (and hiding) ontology. The independent view has been documented by the International Organization for Standardization as a standard for electronic data interchange (EDI). (ISO/IEC, 2007) The dependent view of REA has many implementations in numerous fields, and has been mapped to other enterprise-centric ontologies. (Gailly & Poels, 2009; Geerts, 2011)

The Resource-Event-Agent-Unit (REAU) ontology is a slightly divergent interpretation of the original Resource-Event-Agent (REA) data model. (McCarthy, 1982)

Given that REAU uses the exact same primitives as the REA ontology mapping it to other interpretations and implementations of REA, and ontologies that have been mapped to the original interpretation of the REA ontology, is straightforward.

The second section explains how REAU relates to the other interpretations of REA. The third section presents the REAU ontology and explains how REAU and the other interpretations of REA can be used to separate sensitive from shareable transaction data.

2 Protecting sensitive data with REAU

The proof of concept will use the REA-based EDI standard from ISO to share unclassified information in the collaboration space. As dependent view interpretations of REA have proven their effectiveness for building accounting information systems, the proof of concept will use the dependent view as the standard language for classified information.

Research has shown that a transformation between the trading-partner view and view-independent format requires additional concepts. (Laurier & Poels, 2014) The proof of concept will show that minor adjustments to the REA data model are sufficient to allow for such transformations. The ontology behind this divergent interpretation of REA will be called the REAU ontology. REAU will allow for an automated distinction between classified and unclassified transaction data, a publication of unclassified data in ISO EDI format, the interpretation of ISO EDI data as dependent view data by each of the trading partners involved, and an interpretation of unclassified dependent view data for the purpose of publication. Fig. 1 visualises the above.

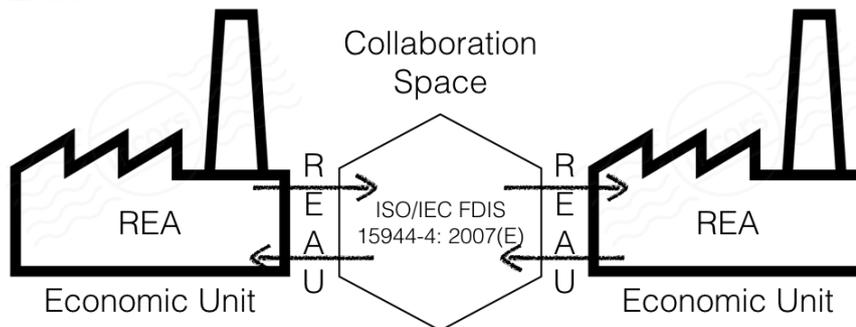


Fig. 1. REA implementations and their context

3 The Unit-Resource-Event-Agent Ontology

The REAU ontology is based on the primitives of the original REA data-model. (McCarthy, 1982) In REAU, *economic resources*, which will be abbreviated to resources from now on, are also defined as things that are scarce and controlled by trading partners and have utility to them. *Economic events*, which will be abbreviated to

events, are still defined as phenomena that reflect changes in the value or quantity of these resources. *Economic agents* (abbreviated as agents) are natural or legal persons that participate in economic events. They can participate in events on behalf of another economic agent (group). Such an economic agent (group) is called an *economic unit* (abbreviated as unit) and is defined as a (group of) natural or legal person(s) that experiences the effect of an economic event. The same person can play the economic agent and unit role simultaneously.

Although the control participation in McCarthy's 1982 paper is ternary, all other associations are binary. In some implementations of the REA ontology, this ternary control association has been replaced by a binary association called participation. (Hruby, 2006) The use of ternary associations is the main difference between REA and REAU, as the latter only uses ternary associations, all related to the unit that defines the perspective. In REAU a *stockflow*, which is typically an association between a resource and an event, is also related to the unit for whom this stockflow is either an *inflow* or *outflow*. A *duality*, which is typically an association between two events, is also related to the unit for whom the inflow (increment) and outflow (decrement) events are paired in duality. Finally, the participation association between a unit and an event is also related to the unit for whom the unit participates in the event. Fig. 2 summarizes the above.

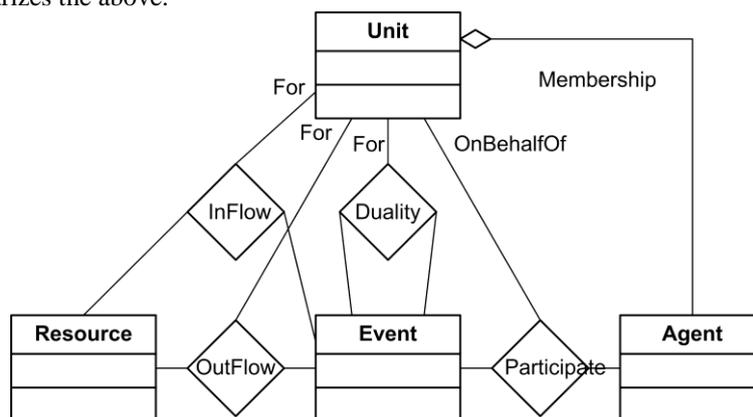


Fig. 2. The REAU ontology implemented as a data-model with ternary associations

The ISO standard focusses on the inflows and outflows that affect units in the collaboration space. Agents play the inside agent role; therefore they are considered classified or irrelevant and will not be shown in the collaboration space. REAU's ternary inflow and outflow associations are decomposed into a stockflow (between a resource and an event) that is the same for all trading partners involved, and participations (between the event and the unit) that distinguish between inflows (*to*) and outflow (*from*) for a unit, in the ISO standard. In this standard, there is only one duality between the events, which implies that all trading partners in the collaboration space agree on the existence of this duality. REAU's unilateral definition of a duality as perceived by a unit matches the definition of a value interface in the e3value ontology. (Gordijn, 2002)

On the other hand, dependent view REA focusses on the perspective of the unit that defines the perspective and owns the accounting information system in which the data are encoded. Consequently, all ternary associations relate to the same unit instance. As a result, this view determining unit is made implicit, which hampers the transformation of dependent to independent view. The contribution of the REAU ontology is making this view-determining unit explicit to make these transformations possible.

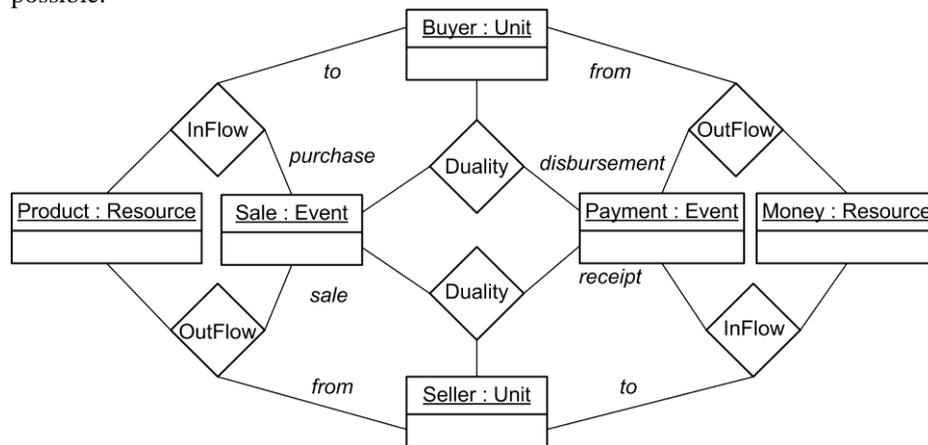


Fig. 3. The REAU ontology pattern for EDI data

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