

REA as an e-business ontology.

Position paper

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Summary

REA has been recognized as a sound foundation for an e-business ontology. However, some adaptations are needed to cater for the complex and dynamic context of e-business.

Introduction

The REA ontology was originally designed for business accounting [1]. When e-business standards and implementations developed beyond the mere exchange of electronic messages, it was recognized that REA could very well serve as the basis for inter organizational (e-)business processes as well [2]. The reason is that REA is based on the fundamental principle of the exchange of economic resources, which is the essence of commercial activity.

However, the present REA ontology lacks some concepts and structures that are essential to the (automation of) complex commercial and operational business relations today. In particular:

- REA does not include concepts or mechanisms to define the (legal, regulatory and technical) *context* of a business relation, which defines the boundaries (or the ‘playfield’ of the bilateral contracts to be negotiated and closed.
- A contract in REA is (by definition) a bundle of commitments to make economic events happen, while in practice many contracts just set the conditions for ‘lower level’ agreements (like call-offs) that really trigger the events.
- Duality and reciprocity are modeled in REA as one-to-one direct associations between Commitments, resp. Events, while in practice these associations are often many-to-many and are defined and controlled by the contract.
- REA supports the definition of *what* resources are exchanged, but not *when* they are and in what order (the business process). Although process definition is probably out of the REA scope, for e-business systems it is essential and the link with the REA concepts must be clear.
- Commitments in REA are defined in an absolute way, while in practice (and certainly during negotiations) commitments are often conditional, to other commitments to be accepted by the other party, or to events to happen.

In this paper we give a number of suggestions, how to adapt the REA model to support complex e-business relationships.

Business conversation

A business conversation consists of a series of statements or utterances, alternately (but not strictly alternately) uttered by the two parties. Utterances may relate to real world events that a party has observed (like the production of goods or the delivery of consignments) or to decisions the party has made (like the decision to purchase products from the other party). Between the parties there must be some communication system installed that relays the utterances. That system can be as simple as the air (allowing the parties to talk to each other) or be as complex as a network connection between the party's ERP systems. In both cases the conversation between the parties has the same meaning, at least commercially and legally.

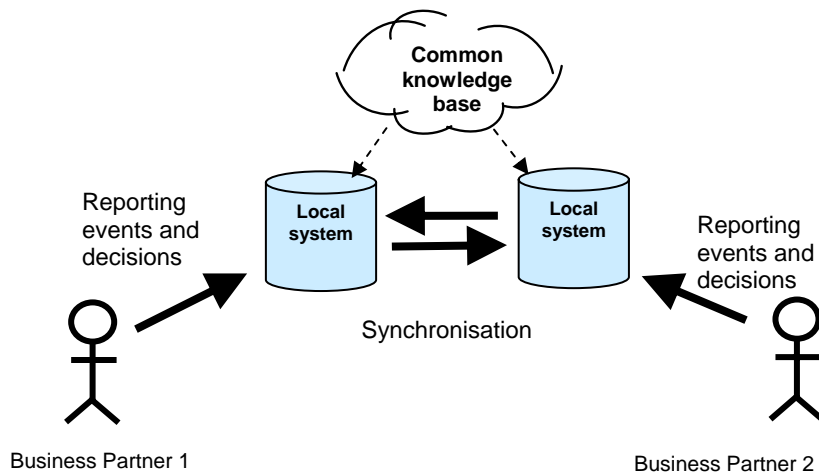


Figure 1. E-business communication

The history of the conversation is significant for the commercial and legal relationship and consequently for the future course of the conversation. Therefore utterances are remembered by the parties or, in other words, (virtually) stored in a knowledge base that is common to the parties. Technically that “knowledge base” may be implemented in the respective private information systems or ERP-systems of the parties. The knowledge base may alternatively (or additionally) reside in the file cabinets in the parties' offices, where paper documents are being stored. In case the conversation is conducted by telephone or during a business lunch the knowledge base may even only be the personal memories of employees or agents.

Utterances make reference to the knowledge base and their meaning is dependent on the state of affairs in that base. Therefore there must be consensus among the parties about the ontological structure of the knowledge base. The REA model forms a sound basis for that structure. On the other hand, the knowledge base in fact only contains utterances that were uttered earlier during the conversation. In principle the ontology itself must be defined by means of utterances and accepted by the other party.

Not all utterances are allowed at any time in order to be (economically, commercially, legally or even socially) meaningful. The sequence of utterances (and their content) must fit a pattern that is agreed among the parties in advance. Such agreement may have been reached in explicit bilateral negotiations, or it may implicitly be defined in the context of the industry the parties do business in. Patterns and conditions may also be imposed by legislation. In fact a hierarchy exists, where (inter)national legislation defines the playfield where industry sectors fill in general patterns and conditions. Individual organizations bilaterally specialize those patterns and conditions in contracts. See figure 2.

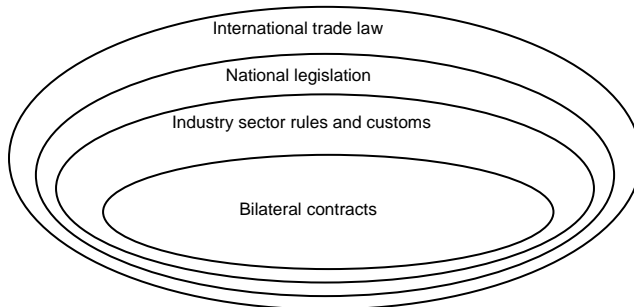


Figure 2. Hierarchy of communication patterns and conditions.

Utterances have some purpose in the business relationship; they control the economic events parties need to perform in order to trade successfully. Decisions and events result in updates to the knowledge base. As knowledge is added, subsequent events and decisions are triggered, defined or restricted. Future conversation patterns may be restricted as well. In this way processes can be specialized. The ‘playground’ of the business relationship is restricted as illustrated in figure 2, by means of a normal business process (e.g. contract negotiation and conclusion).

Linguistically, an utterance has a specific structure. An utterance assigns values or value spaces to properties of (real life or virtual) objects or object classes. The assignment however is performed subjectively by a party, with some intention. So each value(-space) assignment has some intentional value that may be expressed by a verb. Jayaweera [] has built a taxonomy of such verbs in relation to the REA model which is based on Speech act theory []. The intentional value of verbs is more fine-grained than the REA concepts identification-commitment-actualization. It is possible to use the verbs as an indication of the level of commitment.

An e-business system, as described before, can only allow utterances (being decisions and reports of events) that have previously been defined (‘typified’). Such system cannot enforce the parties to let certain events happen. The enforcement must be modeled in the process itself explicitly and may get the form of an allowed ‘reminder message’ from the other party after a time out. Or it may escalate beyond the agreed e-business process (e.g. the party may be sued to court).

REA adaptation

In order for the REA model to support e-business processes, we propose the following modifications to the REA model:

1. Widen the scope of the commitment concept to include other (e.g. legal) obligations.
2. Make commitments/obligations conditional (to other commitments or events) in order to be able to define the process flow.
3. Enrich commitments with verbs that express the level of commitment, and define communication patterns that fit those levels (e.g. propose-accept, request-response, commit-report).
4. Remove the direct duality association between economic events. Events are meaningful in relation to the commitment or obligation that prescribes them, not directly to other events.
5. Remove the direct reciprocity between commitments. Commitments have been agreed in the contract and the contract only defines the association between commitments and obligations.
6. Decompose the contract in multiple levels, where higher levels set conditions and boundaries for lower levels. High levels may not have been agreed bilaterally, but define contextual (e.g. legal) conditions binding both parties.

In figure 3 the adaptations are illustrated in a simplified REA model.

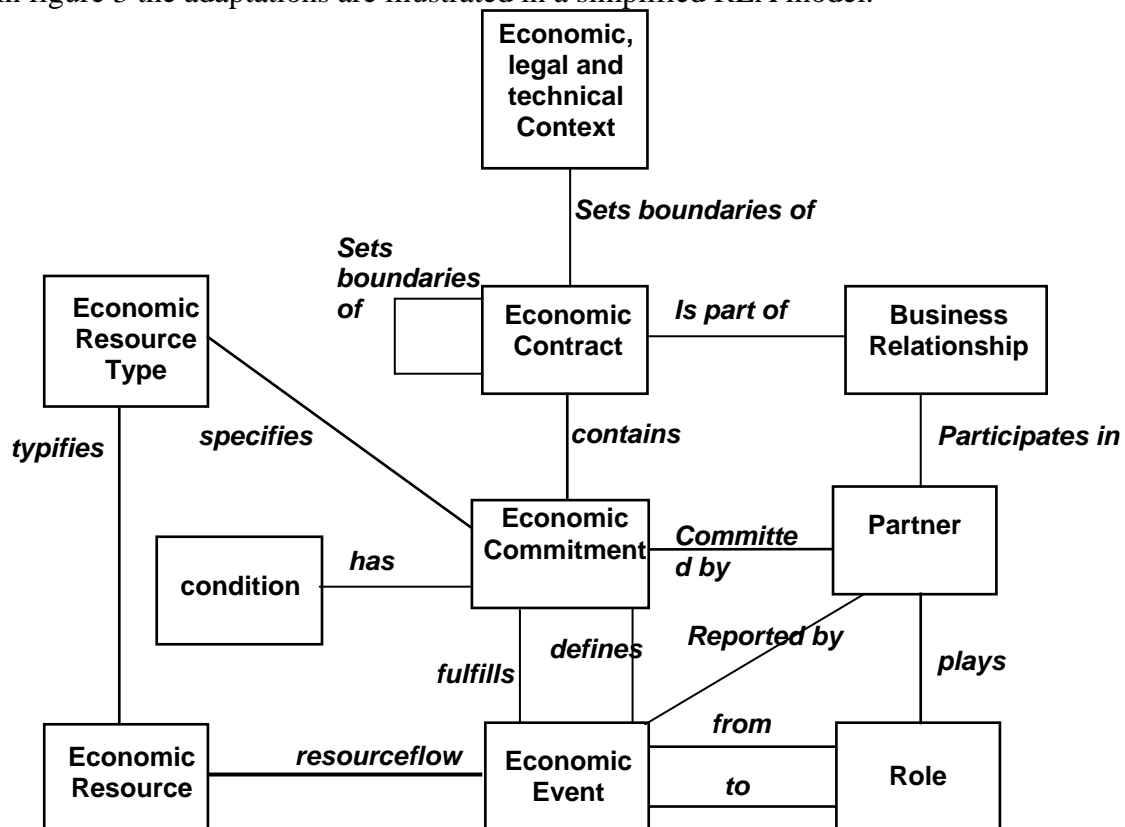


Figure 3. Simplified adapted REA model.

References

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