Adopting and Extending REA Terms in the Financial Industry Business Ontology: A Case Study

Mike Bennett

Enterprise Data Management Council, London, England
mmbennett@edmcouncil.org

Abstract. This paper describes an initiative to make use of terms in the REA (Resources, Events, Agents) ontology as conceptual semantic building blocks in the Financial Industry Business Ontology (FIBO). The modeling philosophy of FIBO is described. The REA concepts are framed in terms of existing abstractions in FIBO or as new abstractions to be added. Three specific aspects of the alignment are explored: the transaction commitments as seen from the perspective of each participant for the purposes of accounts reporting; the distinction between contractual and non-contractual transactions and the treatment of transaction events. These areas of alignment are under active investigation within the FIBO development team and are intended to be the subject of a future addition to the FIBO formal specifications, in support of derivatives and other financial industry concepts.

Keywords. REA, Ontology, FIBO, Financial, Transaction, Accounting, XBRL.

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1 Introduction

The Financial Industry Business Ontology (FIBO) [1] is an industry initiative to standardize the terms used in the financial services industry. Terms are defined at the business level, as concepts. The model is framed entirely in the constructs of the Web Ontology Language (OWL) [2], these being represented in a tool designed for the Unified Modeling Language (UML) [3] using a standard OWL profile, the Ontology
Definition Metamodel (ODM) standard [4]. UML tooling is used to provide a business facing view of the model content.

In order to represent types of derivative instrument and facts about these it was necessary to identify and use a standard model of transaction concepts. Such a model is the REA (Resources, Events, Agents) Ontology in ISO 15944-4 [5].

2 FIBO Modeling Philosophy

The philosophy of FIBO is that industry terms in the model are derived by extension from more basic, semantically atomic concepts. These concepts represent some simplest possible kind of thing. For example the semantically atomic representation of a Contract is a class of thing which has all the properties which are necessarily true of a contract, and no properties which may apply only to a sub-set of types of contract.

Wherever possible, semantic abstractions are taken from models developed by the most appropriate community of practice for those terms. These may be industry consortia, standards bodies, or academic research communities.

FIBO Makes use of a set of upper ontology partitions. These are derived from Sowa (2000) [6]. These include a set of partitions defining things whose definition is contextual, their context and the things which may fulfil the defined role, and a pair of partitions distinguishing things defined with and without reference to time.

3 REA Alignment Activities

Alignment with REA covered a number of aspects of both models. Figure 1 shows the basic REA ontology concepts as they are modeled in FIBO. Of particular interest is the treatment of the commitments made in the two sides of a transaction and the treatment of REA events in terms of FIBO event and activity semantics.

3.1 Transaction Sides and Commitments

In REA, a transaction has two sets of commitments. Each of the commitments is seen by one or other party as a right or an obligation.

In securities and derivatives models, the words “side” or “leg” have two applications which are not semantically compatible. Both of these senses may be seen in the FpML derivatives messaging standard [7] for example.

1. The “side” or “leg” of a transaction as described in the round, e.g. the payment side, asset return side etc. These descriptions of cashflows are defined without reference to one or other party’s perspective.
2. The “leg” of a transaction described specifically from the perspective of one participant. One or other leg of a swap may be described as being a payment leg or a receipt leg, from the perspective of one party.
3.2 Aspects of Commitments

REA describes transactions “in the round”, rather than from the perspectives of one or another participant. Double entry book keeping reports on each side of a transaction from the perspective of one party, and may be reflected in XBRL [8] reporting.

In order to reconcile these different perspectives, it was necessary to frame both perspectives within a common framework, using the FIBO upper ontology lattice.

FIBO has a concept of a “Relative Thing”, being some thing defined in some context. Every relative thing has a property identifying the context in which it is defined. Typically this is a business service area. However, if the context is instead some class of independent thing, then this implies that the relative thing is some “aspect” of that thing. If the thing has two sides, such as a coin, then it is one or other side of the coin (or its edge). By extension, if we take a non-physical two sided thing, such as a commitment, then the “aspect” is some perspective on that commitment.

Each commitment in a transaction may then be described as an obligation or as a right, these being two aspects of the commitment. These may be for example the obligation to deliver and the right to receive delivery, or the obligation to pay and the right to receive payment. Then we have something which may be reported on in the books of that entity: some obligation (a liability) or some right (an asset).

Note that this pattern describes the aspects of a commitment whether or not this commitment is made as part of some transaction, so this pattern applies at a level of abstraction higher than that of transactions specifically. This may then be specialized in the context of transactions.
Commitments, Obligations Rights and Undertakings. In natural language these words range over a number of similar concepts which are semantically distinct in FIBO. We elected to pick words according to their most common usage as follows:

Commitment: in which some party makes an undertaking to some other party,

Obligation: some commitment seen from the perspective of one party, where that party has some obligation to deliver cash or goods or services.

Right: some commitment seen from the perspective of one party, where that party is the beneficiary of the commitment. That is, some right to receive goods or services or payment.

Undertaking: the temporal event in which some commitment is made by some party to some other party.

3.3 Contractual and Non-contractual Transactions

In FIBO, transactions between business entities are regarded as being accompanied by some contract. This may be a written or unwritten. The REA Ontology is used not only for transactions between entities, but for transactions between business units within an entity, which do not have contractual standing.

This leads to the requirement for two parallel sets of abstractions in the FIBO class hierarchy: transactions which may or may not be contractual, and contracts which may or may not relate to a transaction. These two taxonomies are brought together in the context of transactions between contractually capable entities, such as derivatives transactions, securities trading and other financial services transactions.

The REA/FIBO mapping needed to distinguish between agreements and contracts. REA frames “Contract” as a sub-class of “Agreement”. FIBO treats agreements as a class of arrangement between parties, and contract as a distinct kind of instrument with a relationship to the agreement.

We therefore changed the REA-derived transaction terms to reference “Agreement” rather than “Contract”. This may then be used to describe transactions within entities. This is further specialized to refer to a contractual agreement for transactions between separate contractually capable entities.

3.4 Transaction Events

In analyzing the REA concept for “Event”, it was seen that this refers to the overall transaction event workflow. In terms of the pre-existing concepts in FIBO, this is equivalent to a business process, itself a kind of activity. Meanwhile FIBO has a separate term called “Event”, which defines anything which has some time and some (physical or virtual) place. This corresponds to REA “Business Event”.

REA Event was made a sub class of FIBO “Activity”; being the business process of a transaction side, such as a payment process or a delivery process. This was renamed to “Transaction Event”.

Business processes such as clearing and settlement, as well as complex schedules of cashflow payments, may then be described as a FIBO process (REA “Event”) which is broken down into discrete FIBO events (REA “Business Event”).
4 Summary

This aim of this work was to reuse terms in the REA Ontology as semantic abstractions for FIBO. Some REA concepts were promoted to a higher level of abstraction than would be needed for transactions alone, while others were identified as transaction-specific concepts. All FIBO and REA-derived concepts were situated within a broader set of upper ontology partitions. The upper ontology partitions were used to provide a conceptual bridge between concepts derived from REA and concepts relevant to double entry book-keeping and reporting. Other upper ontology partitions provided a means to formally map out the complex transaction process workflows, framing these in terms of the REA event and business event concepts.

The results of this work will form the basis of a foundational semantic model to be used in over-the-counter derivatives contracts, exchange traded derivatives, securities transactions and payments. Future work will include a more complete and formal cross reference from the REA-derived terms in FIBO to the concepts in the double-entry book-keeping and XBRL universe.

References