Claims, Debt and Equity in REA With FIBO Extensions

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This paper develops a method to identify and formally model how the REA concept of Claims fits into our understanding and extension of the core REA concepts in work derived from early FIBO (Financial Industry Business Ontology) and now characterized as the Semantic Shed's Business Core Concept Ontology (BCO). In this exploration we determine that the notion of Claim relates to two important concepts, those of some imbalance between commitments and of the perspective on such imbalances. This paper sets out the basic concepts of REA and its later extensions by the FIBO team and the Semantic Shed community, in set theoretic concept intensions. The paper goes on to define the key concepts of imbalances and of perspectives on commitments and on imbalances. We then consider the definition of 'Claim' in REA as a terminological challenge. Some conclusions are given about where Claim fits in with the ontological terms given here and how Equity and Debt are framed with reference to these.

Keywords: REA ontology, commitments, claims, semantic meaning

INTRODUCTION

This paper presents an ontological analysis of the concepts proposed for extensions to the REA ontology to accommodate or define Claim, Debt and Equity. This approach is distinct from a terminological approach. We do not ask "What does this word mean?", but rather "How is this meaning worded?" Put more clearly and avoiding the problematic word 'meaning' altogether, what we do here is to define concepts. This is done using intensional definitions of each concept, where these intensions are framed in set-theoretic or first order logic. This reversal of direction from 'words-to-meaning' to 'concepts-to-words' is important, because in this exploration we will not ask "What does Claim (a word) mean" at all. Instead, we will map out the conceptual space in which the notion of Claim is seen to operate and ask which of the various concepts can most effectively be labeled as Claim, as Debt and so on.

The logic used here and loosely referred to as First Order Logic is that which is commonly expressed in OWL (Web Ontology Language) and other ontology languages; here we use the evolving language used in the Cameo Concept Modeler (CCM), from NoMagic Inc., this being part of the proposed Semantic Modeling for Information Federation (SMIF) standard at the Object Management Group (OMG). Models

created in CCM are also capable of being expressed in OWL, so readers who are accustomed to OWL can think of these concept definitions as being expressible in OWL. At the same time, this kind of logic or a significant sub-set of it can be expressed and explained in set-theoretic terms to a business audience of subject matter experts. Additional features such as existential and universal restrictions are harder to represent visually but can be determined by asking targeted questions of the business audience while looking at the simpler graphical representations of sets and relations. In this exploration we do not go into the level of detail that would imply the use of restrictions on classes, though some are in fact used. Where used, these are expressed using the CCM idiom as being simple re-uses of more general properties. A formal ontology model derived from this work may require the addition of further formal restrictions and other set-theoretic / first order logic concepts. The important thing in this exploration is the centrality of concepts as distinct from their labels or words.

The paper proceeds as follows. First, we examine the literature as it related to REA modeling through ontological analysis. Next, we state our interpretation of some of REA's relevant concepts. We then provide an initial investigation of the implications of those interpretations. This is followed by a detailed analysis of the semantic situation of claims, debt and equity. When then provide some details of how the results can be further modeled. We then summarize our results and provide some concluding statements.

LITERATURE REVIEW

Accounting is often considered as a data discipline which deals with "facts" and "measures." Recently, a more nuanced appreciation of the semantic depth of accounting has bee uncovered by researchers. Aparaschivei (2007) was one of the first researchers to look at accounting through the lens of business knowledge. He makes the now well-known distinction between data, information and knowledge where knowledge is seen as the interrelationships between informational items. The relationships between concepts are the hallmark of ontologies. Du and Zhou (2012) show how financial ontologies can be leveraged to improve the quality of financial data. Their study came out at the time the Financial Industry Business Ontology (FIBO) was beginning to be developed conjointly by the Object Management Group (OMG) and the EDM Council. Their paper addresses the issues of terminological ambiguity and conceptual inaccuracy. Both these issues are also addressed in the present work in the REA context. Lee (2009) reports on a socially rich dialogue about accounting standards setting. His paper highlights the conceptual richness of accounting standards and standard setting processes. It also argues for consideration of context in the standard setting process where context grounds the business meaning of accounting concepts when they are employed in different business circumstances. Swanson and Freeze (2009) propose using an ontology to guide the FASB and IASB's conceptual framework project.

Sugumaran and Storey (2002) argue for developing and organizing ontologies by domains rather than by stand alone projects. They prototype procedures which can create and use domain ontologies which are then modeled in database systems. A benefit of their approach is that ontologies can be reused over multiple systems development projects. Chou et al. (2008) use the approach developed by Sugumaran and Storey (2002) to develop an accounting domain application for web-based profit and loss calculations.

McCarthy (1982) introduced the REA model by conceptualizing the accounting domain into resources, events and agents. This seminal work has triggered much further research. We limit ourselves to considering the ontological research that stems from it. Geerts and McCarthy (2002) developed a domain ontology from the existing REA concepts (economic primitives) and some extensions. The domain ontology was proposed as guide to further extensions of the REA conceptual model. Geerts and McCarthy (2006) follows up on this work by extending the REA conceptual model to the realm of business policy. Gailly et al. (2008) use ontology classification schemes and application frameworks to classify REA and its applications. They then recreate REA's ontological specification in UML. They then use OWL and Protégé to graphically represent the REA ontology. Murthy and Geerts (2017) reverse the data flow of these modeling efforts by using the ISO REA specification to ingest big data back into the REA conceptual framework.

Bennett (2015) began the current thread of these developments by using REA claim semantics to analyze the conceptual distinctions between equity and debt. McCarthy et al. (2018) provides a reaction to

the proposals made in Bennett (2015). The current paper continues the development of these conceptual modeling efforts.

REA TERMS

The following sets out our understanding of the concepts given in REA and some notes on these.

Claim

The REA concept of a claim addresses the imbalance between the obligations (benefits) of outstanding commitments within an agreement. To consider a claim we need to address the concept of an agreement.

An agreement is a collection of Commitments negotiated between 2 or more counterparties. Once we specify the party in which we are interested, we can aggregate those parties' commitments. For each resource under consideration we can quantify the amount that is owed or the amount of benefit. This can be done for all commitments under a single agreement or across multiple agreements. We will derive a surplus, deficit or balance which represents a "position".

Since the commitment specifies when a commitment will be due, we can identify a time line. If commitments are "due" or "overdue" we have a "realized" claim.

Value

To Compare claims across different contexts we need the concept of a "value". A value expresses the quantity of a resource parcel in terms of another resource (typically, but not necessarily money). We can envisage valuation as the "estimation" of an exchange rate of one resource parcel for another (an exchange rate or price).

Equity

Considering Equity as it refers to shares, trust units etc.: For the sake of this discussion we shall treat them as the same and refer to them as Equity Units. Considerations of differences can be deferred without affecting the principle.

Equity units evidence ownership of a heterogeneous resource. As with any owned Resource, the owner is entitled to dispose of the resource as they see fit. There is however no enforceable Claim requiring any entity to deliver any resource to the owner. In the case of a share, the owner has no right (individually) to require any entity to deliver any portion of the heterogeneous resource. Depending on control rights, holders may agree to deploy the shared resource as they see fit.

In this context, we may talk about ownership entitlements, but these are not claims in the sense that there is no enforceable claim.

The differences encapsulate the conceptual difference between the accounting concept of Liability and Owners Equity (also called Proprietorship).

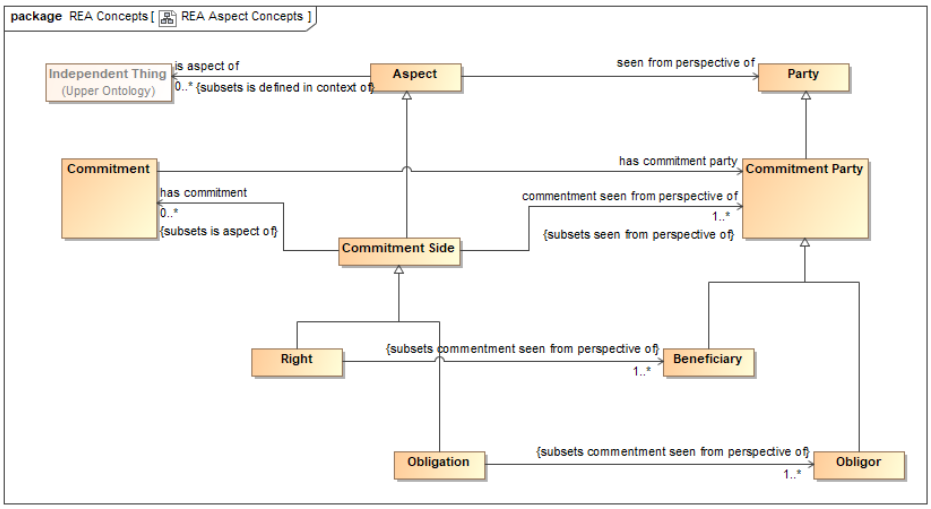
Accountants typically create categories of proprietorship (e.g. valuation reserve, provision, retained Earnings). In accounting, we talk of Owners Equity as a "Claim" by the owners upon the business. This is however quite different to the commitment as a claim. Perhaps it could be referenced as "ownership claim," but semantically we must distinguish it from a claim on an obligor.

EXTENSIONS IN PRE-FIBO WORK AND THE SEMANTIC SHED

Sides or Aspects of Things

The model for the sides of things is derived from the Top Level Ontology (TLO) notion of Relative Thing wherein the context (usually a Mediating Thing) is instead defined as any Independent Thing, so that the aspect is simply an aspect of some thing, i.e. something described relatively to that thing. For accounting concepts this is used to make a bridge between the REA notion of a Commitment as seen in the round, and the aspects of that commitment seen from the perspective of one or another party as a Right or an Obligation, and reported more specifically as an Asset or a Liability. This core model is shown in Figure 1.

FIGURE 1
REA ASPECT CONCEPTS

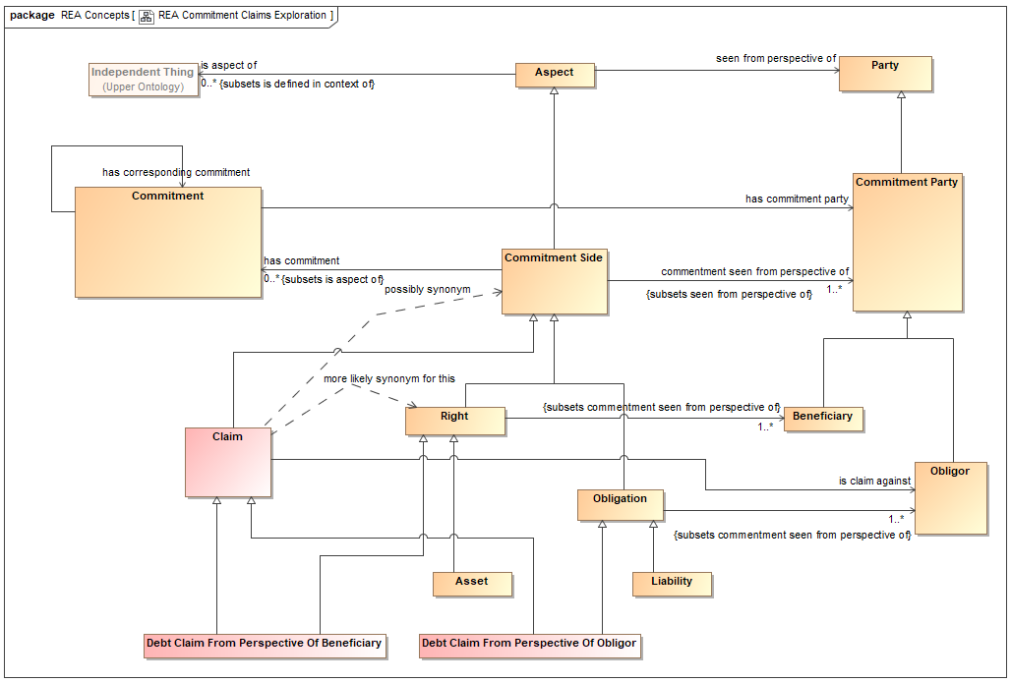


INITIAL INVESTIGATION

We considered where the notion of 'Claim' might fit in terms of the established concepts of the perspective of a claim and of the imbalance between claims.

These concepts were then modeled in the Cameo Concept Modeler. Here the term 'Claim' and its proposed sub classes were placed on the diagram in pink and some suggested equivalency relationships were sketched out using basic UML dependency relations (Figure 2).

FIGURE 2
REA COMMITMENT CLAIMS EXPLORATION



Polyhierarchy

Given that 'Commitment Side' has as its children the classes of Right and Obligation, the first question is whether Claim is independently a sub class of 'Commitment Side' or coextensive with it. If the former, would this form a second sub-class of 'Commitment Side' independently of the classification facet which gives us Right and Obligation?

If so, what would be the differentiae by which this new sub-class or set of sub-classes be defined? That is, what makes a claim a claim?

Conclusion: The notion that 'Right' may be relabeled as 'Claim Right' and regarded as co-extensive with 'Claim' was compelling but in the end this does not represent any notion of imbalance.

It is not possible to respect the notion of Imbalance and also retain the earlier proposal that REA Claim is the same as or related to the 'Side' or 'Aspect' of a Commitment.

DETAILED ANALYSIS

Claim Concept Refinement

There are two matters in place that might relate to the definition of or of concepts around Claim:

- Being from some perspective
- Involving some imbalance

Taking the example of debt as claim, which is non problematic.

REA as a whole views things as seen from a 'helicopter' view and not as seen from some party's perspective. It should be possible to frame the notion of Debt and the notion of Claim on which it depends, in a non perspectival manner.

It should then be possible to frame, as a separate concept, that same matter as seen from the perspective of one or another party.

The FIBO extensions to REA frame the notion of an 'Aspect' of a commitment, as seen from the perspective of one party to that commitment. It defines two such Aspects, from the perspectives of the two parties to the Commitment (the parties being the Obligor and the Beneficiary), as being Asset and Liability. These then become the subject matter that is reported on in accounting books.

Analysis and Observations

We start with the premise that whatever there is that is reported from some party's perspective, there is that thing as seen in the round. In relation to Debt, if there is something that is a debt claim as seen from some party's perspective, then there is something that is that debt claim in and of itself.

Looking at the in-the-round aspect of the model, for Commitment, there should be some kind or kinds of Commitment relating to Debt, as a sub class of Commitment.

Specifically: for a debt transaction or contract, there are (at least) two commitments:

1. The commitment on the part of the lender to transfer the capital amount
2. The commitment on the part of the borrower to pay back the capital amount

This is in addition to the commitment(s) to pay interest amounts.

In a typical retail / personal loan contract, the regular payments committed to will pay down both the interest commitment and the principal repayment commitment. Typically a single equation is defined which takes a fixed monthly payment amount and allocates different portions of this to the interest and the capital amount (principal).

Ignoring interest (and assuming the principal repaid is the same as that lent, i.e. not Islamic or discounted lending), then the two main commitment defined above work as follows:

- Commitment (1), the commitment to pay principal, is instantiated and almost immediately discharged (by delivery of the principal amount to the borrower)
- Commitment (2) remains alive, in whole or in part, until the maturity (end) of the loan transaction. Paying off the principal bring the transaction or contractual relationship to an end

During the time that Commitment (1) has been discharged but Commitment (2) remains alive, there is an imbalance between these two commitments. This imbalance is by definition a debt on the part of the Borrower, owed to the Lender.

Conclusion: Debt is and is only the imbalance between two commitments that are both related to the same two entities, as parties to the same lending agreement or transaction.

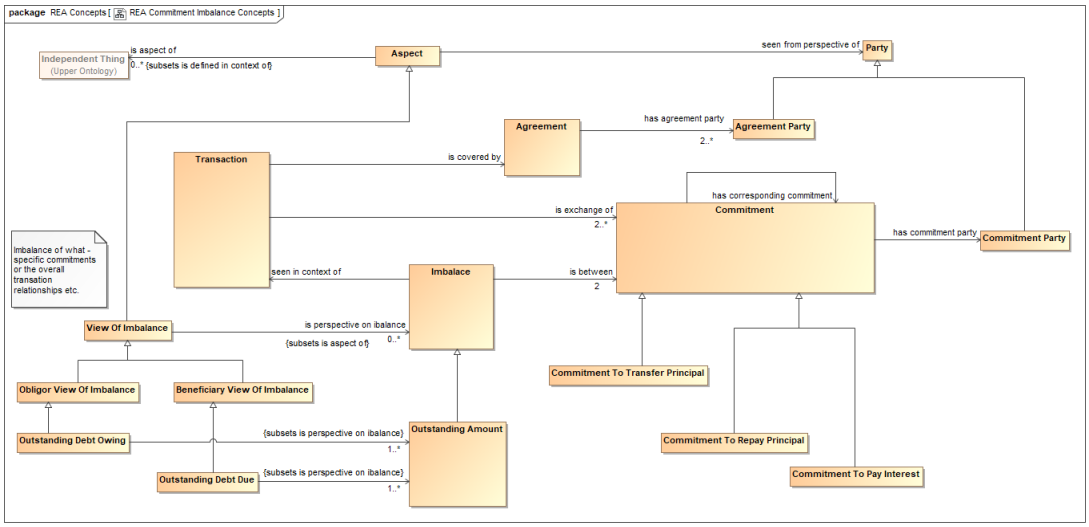
That is, we refer to loans, bonds and other debt instruments as debt, not because there is something that is intrinsically defined as Debt that passes between them or forms the basis of the Transaction as defined in REA; but because during the life of the agreement the arrangements entered into (paying money now, paying money later) are necessarily in a state of imbalance. At any stage during the life of the loan – that is, after Commitment (1) is discharged and before Commitment (2) is discharged – there is a Debt in existence.

This being so, if there are two Commitments that are mutually referenced via an Agreement (i.e. an REA Transaction), and there is an imbalance between these, that is a Claim. It is also a Debt.

From one party's perspective, this Debt is defined as being owed to them. From the other party's perspective, this same Debt is defined as being owed by them.

Figure 5 starts to put labels on these concepts.

FIGURE 5
REA COMMITMENT IMBALANCE CONCEPTS



We can label the thing in the round as 'Outstanding Amount' or synonymously as Debt. This is 'Outstanding Debt' which is not the same thing as the Debt Principal.

We can label the perspective on these as being 'Outstanding Debt Owing' and 'Outstanding Debt Due'. These two concepts are Aspects, that is perspectives upon, the imbalance between the (separate) Commitments.

That is, these are not related to aspects of one Commitment, but to aspects of one imbalance between two Commitments.

The (outstanding) debt owing and due are two perspectives on that Imbalance.

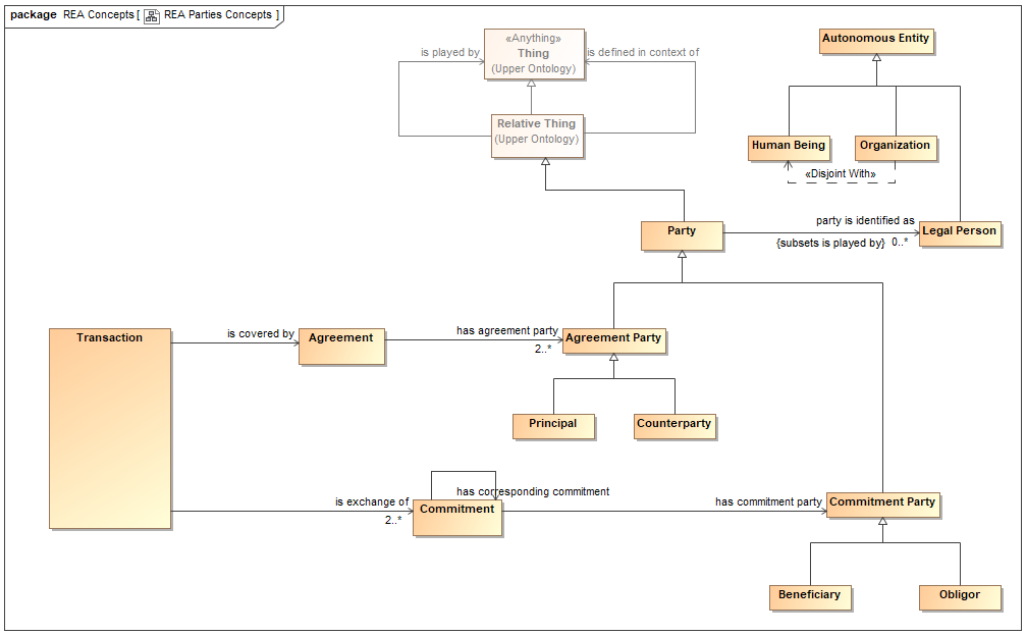
Parties

The parties from whose perspective the Imbalance is viewed, are not the two parties to one Commitment. They are the two parties to one Transaction (or Agreement).

Then there is a relationship between different 'Parties' where Party is understood (as in English) to mean some entity defined in terms of their having a part in, or being 'a party to' some formal matter such

as a Transaction, a Contract or a Commitment. In FIBO this is called PartyInRole. Here we call it Party. See Figure 6 for these concepts.

FIGURE 6
REA PARTIES CONCEPTS



Each Party has a relationship to the actual entity that is the party, i.e. that plays the role (or parthood) implied in the Party concept. Recall that all Relative Things, of which Party is a kind, are defined in some Context.

Then assuming a Transaction in which there are two participants (Parties) and two Commitments that are mutually related.

The two entities are defined as being parties to the Transaction. We can call them Party A and Party B in the case of a contract that does not have special terms for each, or Principal and Counterparty in a transaction that does make such a distinction. In the case of a debt transaction (a transaction set up explicitly for the purposes of there being debt i.e. lending), we would call the principal the Lender and the counterparty the Borrower.

Now there are two Commitments, mutually related. Starting with the Debt example and then generalizing for all REA based Transactions or Agreements:

- Commitment (1): Commitment to transfer funds
  - The Lender party to the Agreement is the Obligor to Commitment (1)
  - The Borrower party to the Agreement is the Beneficiary of Commitment (1)
- Commitment (2): Commitment to repay funds at a future date
  - The Lender party to the Agreement is the Beneficiary of Commitment (2)
  - The Borrower party to the Agreement is the Obligor to Commitment (2)

Then:

- The parties from whose perspective a given Commitment is defined, for book-keeping purposes, are the parties to each Commitment;
- The parties from whose perspective some imbalance between two Commitments (thereby: some imbalance in the Transaction) is defined, are the parties which, at a given point in time, are the owing party and the owed-to party of that imbalance.

Party Perspectives on Imbalance

Any imbalance between two Commitments in one Transaction, we considered as being by definition a Debt. That is to say, at a given point in time, there is a debt owed by one party to the other as a result of the imbalance between the different Commitments that are involved in the transaction or agreement between those parties.

As seen in the round, this debt is owned by one party to the Transaction and is owed to the other party to that Transaction.

As seen from some perspective, for book-keeping purposes, the debt is seen as being owed by or being owed to one or the other of those Transaction parties.

Critically, the parties from whose perspective we might consider debt is being owed to or as being owed by, are not the same as the parties to one specific commitment or to the other specific Commitment.

However, at any given point in time, the imbalance between two commitments will be reflected in the books of either party as being an imbalance between the opposite aspects of the two Commitments that are combined by the Agreement (Transaction). In the Debt example:

Consider a time T between the discharging (in full) of the lending commitment (Commitment (1), the commitment to transfer the principal amount) and the discharging (in full) of the borrower's repayment commitment (Commitment (2)).

At this time T, there is an imbalance between Commitment (1) and Commitment (2). For simplicity, let us assume that at time T, 40% of the principal has been paid. Let us assume also that the commitments to make periodic payments are regarded as parts of the same, single Commitment (2). Then:

From Party A / Principal Party / Lender perspective (= Obligor for commitment (1) and Beneficiary for Commitment (2):

- Commitment (1):
  - Is fully discharged.
  - Liability on the books for Obligor perspective on Commitment (1) = 0
- Commitment (2)
  - Is 40% discharged
  - Asset on the books for Beneficiary perspective on Commitment (2) = 60% x Principal Amount
- Imbalance
  - Asset on the books for Imbalance = (60% - 0) x Principal Amount

and

From Party B / Counterparty / Borrower perspective (= Beneficiary for commitment (1) and Obligor for Commitment (2):

- Commitment (1):
  - Is fully discharged.
  - Asset on the books for Beneficiary perspective on Commitment (1) = 0
- Commitment (2)
  - Is 40% discharged
  - Liability on the books for Obligor perspective on Commitment (2) = 60% x Principal Amount
- Imbalance
  - Liability on the books for Imbalance = (60% - 0) x Principal Amount

That is, debt is defined as the imbalance between the two Commitments to a Transaction or Agreement at a given point in time, and can be determined on the books of either party to the transaction by determining the difference between the two Commitments, recorded (on the records) as a difference between one Commitment as a Right (therefore recorded as an Asset) of that entity, and the other Commitment as an Obligation (therefore recorded as a Liability) of that entity, at that point in time.

Each party to the overall Transaction will see the Debt as a difference between the current extent of the two mutually related Obligations (as perspectives on Commitments) in the Transaction.

Beyond Lending

In the case of a lending contract (specifically engineered for there to be a debt between the parties during the life of the Agreement), the difference looks the same as the position on the one outstanding Commitment since the other one (the commitment to transfer funds right away) is pronounced dead soon after the signing of the agreement. In a range of other cases, the two Commitments may both survive for a period of time. In these cases, the imbalance becomes more interesting, since it is the imbalance between these at any given point in time.

Claim or Debt

If we define any imbalance between two Commitments (at some point in time) as being Debt, which we think it is, then there appears not to be some other thing that is also a kind of Claim.

There are Asset and Liability positions relating to any specific Commitment, but debt is framed as being the difference between related Commitments.

The reporting of Debt from the perspective of one or the other party simply indicate whether the debt is owed to you or owed by you. It is still Debt, so Debt is always the Imbalance.

On this basis, Imbalance, Debt and Claim would appear to be co-extensive.

Interest

Up to this point we have assumed a single commitment on both parts (i.e. by both parties), relating to the principal amount of a loan, and by extension any other type of Transaction or Agreement.

If we add interest to this (per Figure 3-4), we can consider this in one of two ways:

1. The interest and principal represent separate Commitments as part of the Transaction
    a. So the Transaction has several Commitments on the part of the Borrower
2. The Borrower commitment has several components, one of which is commitment to the act of repaying the principal and the remainder of which are commitments to the acts of paying interest amounts.

Assuming (2) for simplicity:

At any given point in time, the imbalance between Commitment (1) and Commitment (2) is the difference between the two Commitments, which in this case is numerically the same as the extent of Commitment (2) at any given point in time after the initial lending transfer of funds has been made i.e. Commitment (1) is zero in itself and therefore zero from the perspective of either party, while Commitment (2) remains in play.

In this view, the debt that exists is the total of the principal amount unpaid and the remaining interest amounts committed to but not paid. From the perspective of the Borrower (to the Contract) and of the Obligor (of the Repayment + Interest Commitment (2)), both the interest and the principal repayment represent Debt. They also both represent a Claim, which is a claim on the Borrower by the Lender.

Question: Is it the case that interest is generally considered as Debt? Or should we consider interest as being a kind of Claim but not a kind of Debt, in which case Debt means only principal amounts owed?

This is specifically a question about terminology and does not impact the disposition of the concepts.

Question: The Commitment to pay interest does not represent a direct claim in the usual sense (it does not represent a chose in action or a chose in possession) since the borrower is not obligated or expected to pay interest before it is due. In fact each individual commitment to pay interest is a stateful thing (it has a lifecycle in which it goes through several states), such that it exists from the start of the contract, then it gets to a point where interest accrues on the outstanding principal amount at a given time, and then it goes to a state where it falls due, after which it is either paid or is in default.

Is it in the nature of the concept of Claim that it represents an imbalance in any kind of Obligation, or only those that are in a state where they are considered to be due? If we were to assume the latter, then 'Debt' as a thing would not include interest amounts that are not due. This feels closer to how the notion of debt is usually thought to be defined.

In this view, 'Debt' at a given time would be co-extensive with an imbalance in those parts of any claims which are due at that time, whereas 'Claim' more broadly might be considered to include imbalances

that are not due (and cannot be claimed? Again this becomes a terminology question – what do we want the word to mean?)

Equity

An Equity instrument (e.g. a share) is regarded as a Contract. The terms of the contract are generally given in the Share Agreement or Share Terms. A publicly issued share is held anonymously by a number of share holders. These are (anonymous) parties to that agreement.

Like any Agreement, the Share Agreement makes several commitments on the part of the Issuer to the Holder (the counterparty to that Agreement).

To the extent that there are such Commitments, it is possible to describe the imbalance between each such Commitment by the Issuer and any corresponding commitment on the part of the Holder, as an imbalance between these commitments.

There are generally no commitments on the part of the shareholder, though some corporate actions will require decisions or actions on the part of the holder as and when they happen.

Therefore any imbalance across the two sets of commitments in the case of Equity, are co-extensive with the position at any point in time, of the or any commitments made by the Issuer to the Holder.

There are usually no such commitments. Some exceptions are explored below.

Equity as Claim

The question addressed is whether Equity can be defined in terms of the Claim concept, in a way comparable with how we have clearly identified this can be done for Debt.

See also the Mike Bennett paper from VMBO 2015 [2] on this.

The conclusion in [2] is that there is no such symmetry, that equity represents a kind of claim only in the event of the entity winding down, but that at other times it represents ownership. The paper concludes by providing definitions for two legal concepts, 'Chose in Action' and 'Chose in Possession'. It is not clear at the conclusion of this paper whether Equity is to be framed in terms of one or other of these specifically. There is also a note to the effect that one of these two concepts (Chose in Action) appears to itself encompass two distinct concepts: the right to receive or recover something from the other party right away and the right to possess something that the other party holds, in the future. This concept seems also to relate to such things as being wrongfully held by the holder of the 'Chose' right, by the other party, such that actions may be appropriate for recovery of those things.

Equity Claims

To the extent that Equity represents a prima facie claim of the sort represented by Debt, this is a claim only in the event of the issuing entity being wound up.

If the issuing entity is wound up, then it is no longer a party to the claim being made by the equity holder as claimant.

During 'normal' times, the equity does not represent a claim on the company (except as identified below in the separate matter of a claim on par value).

In terms of the 'chose' concepts in [2], equity appears to represent neither of those. What it seems to represent (of itself as a whole and in addition to the below), is only the rights of ownership of the entity.

Equity Dividends

Dividends (ordinary share dividends) do not represent a commitment up front (in the Equity as a contract), so there is no claim as part of a commitment on this.

Preference share dividends do represent a commitment up front. They in no way represent debt, even though like debt coupons they represent a firm commitment.

Further, we believe that the seemingly firm commitment to pay dividends on Preference or Preferred Shares can only be met in the condition that there is a suitable class of funds from which to pay these dividends. So the commitment is in effect conditional on the availability of those funds.

Shares also generally have voting rights. These are described in the agreement for the equity instruments. These may include multiple votes per share or in some cases no votes per share.

Different classes of shares may have whatever terms the issuer chooses to write in for them, so different classes of shares and preference or preferred shares may vary in terms of how the dividends and voting rights and other potential rights are set up.

Where such rights are set up in the contract, these represent a perspective on the commitment made in that (share) agreement, with the corresponding Obligation being made on the part of the Issuer.

For Ordinary Share dividends, although there is not a commitment up front in the contract to pay these dividends, there is a commitment made at a point in time, when the dividend is declared. At that point, there is a firm commitment to all shareholders that they will receive their apportionment of the dividends. This means that there is a Commitment, and therefore a Right and an Obligation, but that these Commitments are instantiated at the moment that the dividends are declared.

There is a commitment in the original contract, of a conditional nature: the commitment is that if and when there is a dividend declaration, the holders of the shares are entitled to receive their apportioned amounts of that dividend.

Meanwhile, there is one other commitment made in the case of equity instruments in some US states (and potentially in other jurisdictions), namely to pay the holder for the shares at par value if demanded. This right is almost never exercised as it is not advantageous to do so, but it nonetheless exists.

Meanwhile it appears that Equity instruments do represent a firm, up-front Commitment, to pay the holder at par value, in some jurisdictions. Therefore, there is a kind of Claim related to Equity, for the Par Value amount.

Ownership

Equity represents ownership. Ownership is defined in terms of one or more Rights.

- The right to hold
- The right to dispose as you see fit

There may be others – need to check in the literature. We need to model Ownership in terms of the specific rights that this represents. There is some work on this in the initial FIBO conceptual models. We need to extend the Social Constructs taxonomy to support this. The FIBO work simply inherits via Capacity, Capability and others, from 'Social Construct' which is itself not expanded upon or articulated.

Equity Summary

The REA concepts can be generalized to any kind of contract or agreement, not only those typically considered to be transactions. These include the contract that constitutes an equity instrument. Note that this is not the same as any transaction for the ownership of the equity instrument (share) in the secondary market since what is transacted there is the right to hold one side of this equity contract. Here we are considering the share contract itself.

There is a possible Commitment that can be represented as a claim when offset against the (null) commitment of the other party, the holder. This is the potential claim of par value of the share in some jurisdictions, including some US states. This right is never exercised as it is not advantageous to do so but is still a Commitment.

In ordinary shares there is a commitment made at the start of the life of the equity contract. This is a conditional commitment stating that in the event that a dividend declaration is made, the holder has a right to receive that payment. Separately, if a dividend declaration is made within any given period, then a non-conditional Commitment exists from that point until it is discharged by payment of those dividends.

In preference shares a more firm commitment is made at the start of the life of the contract, to pay dividends to the holder. This is still conditional, but it is conditional on the existence of the appropriate class of capital from which to pay dividends, rather than being conditional on the declaration of a dividend as for ordinary shares.

Shares also confer rights on the holder in terms of voting and in some cases other things such as conversation into debt at a later date. These rights are not discharged by the payment of monies but by the

exercise of the votes, and so cannot be measured or represented as monetrary amounts. These therefore would not be represented as a claim (imbalance) between the commitments under the equity contract to which the issue is the obligor, and the (non existent) commitments to which the holder is the obligor.

Time: Temporal Dimension of the Commitment

In order to talk about the imbalance between two Commitments at a point in time we need to be able to talk about the lifecycle of the Commitment and the point during that lifecycle that the imbalance is being considered. A Commitment is framed as a Continuant in terms of the Top Level Ontology (TLO) used in the Semantic Shed BCO.

Each Commitment has a life (lifecycle) and follows a process or defines a sequence of events. The life of a Commitment is an Occurrent in terms of the TLO.

Temporal Concepts Terminology

In terms of the original FIBO / Core concept ontology and REA terms:

- REA 'Event' was determined to be a kind of Activity or Process and follows multiple steps;
  - There is one such Event on each side of the Transaction?
  - FIBO / Shed BCO = Activity
- FIBO / Shed BCO 'Event' corresponds to REA 'Economic Event'
  - These are the discrete events and activities that make up a process workflow

A Commitment has a life, which is independent of the life of the other commitment(s) in an Agreement. A life has a beginning and an end.

For Commitment we may call these the Commitment Enjoinder and Commitment Termination. These specialize some general terms we may call Inception and Termination, for the lives of things in general. For humans the equivalent terms might be Conception and Death.

Then to consider the imbalance between two commitments at a point in time, that point in time is applied to both of the Commitments in the Transaction.

For complex Commitments (commitments that specify several events in which part of the Commitment is discharged), selecting different points in time would identify different amounts of the commitment that have been discharged, and different amounts that are outstanding.

Comparing this for both Commitments in a Transaction gives the imbalance between the Commitments at that time.

MODELLING

Imbalance

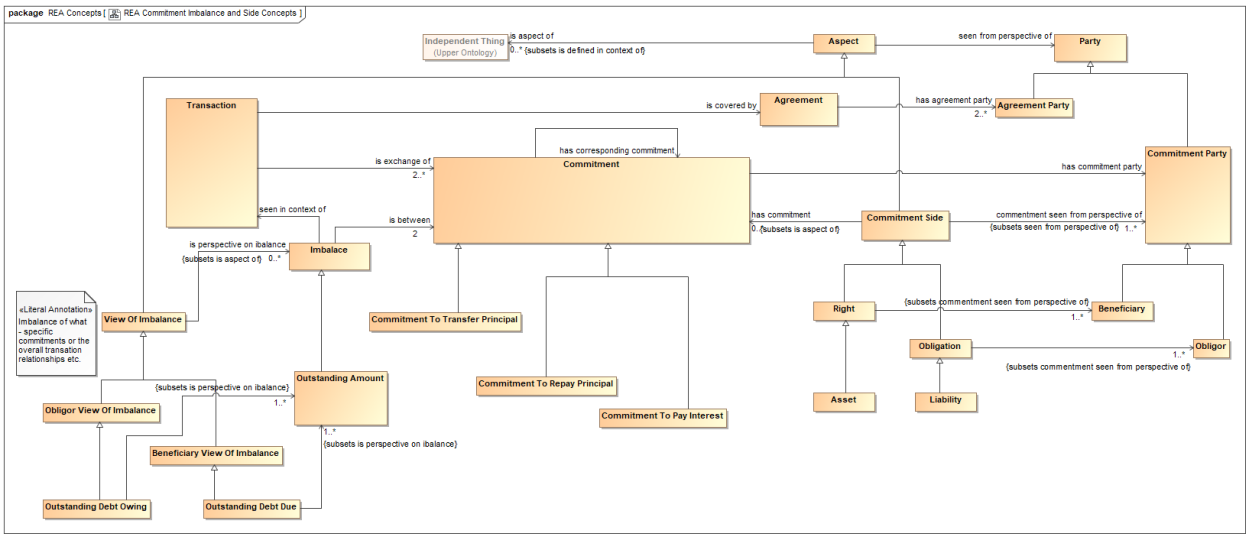
An Imbalance is necessarily between two commitments, one on either side of the Transaction or the (corresponding) Agreement. We ignored for now the question of single compound commitments versus multiple discrete commitments, and will assume single commitments (perhaps with multiple actions specified for either of them), in order to simplify the Claim question.

We added Imbalance to the CCM model (see the earlier Figure 5 and Figure 7 below). This is an imbalance between exactly two commitments, these two being the ones mutually related by a Transaction (and covered by an Agreement e.g. a Contract) in REA.

This Imbalance, like the Commitments, is framed as a thing in itself and not as seen in relation to one or the other Party. As such, like all things REA, it has parties to it. These parties are the two parties to the agreement, who are also reciprocally related parties to the two individual Commitments.

Figure 7 gives a combined view of these.

FIGURE 7
REA COMMITMENT IMBALANCE AND SIDE CONCEPTS



Perspectives on Imbalance

Given the notion of Imbalance, and given that this is seen in the round and has two Parties (the parties to the Transaction and/or Agreement), we can now consider these from one or another perspective.

It became clear that the kinds of perspective-specific matter seen here is similar to but not the same as the perspectives on the individual Commitment. In the case of a lending transaction and agreement, the numbers are exactly the same because one of the two Commitments made in the agreement, the commitment to transfer funds to the borrower, is discharged at the start of the agreement. So the borrower agreement is the only agreement that remains in play – this being the reason that a contract which gives rise to 'Debt' in the sense of an imbalance, is known as a 'Debt' contract. Whereas Commitment Aspects are seen from the perspective of a party to the Commitment, the aspects or perspectives on the Imbalance are seen from the perspective of the party to the Agreement.

Here it should be clear that in defining something as a 'Party' we are using this word in its 'Relative' sense i.e. that which is party to or has a part in some formal matter, and not in its common usage in data modeling as the label for a kind of person or organization (a 'potential party'). For this reason we use the FIBO-derived Semantic Shed BCO Top Level Ontology partitions of Independent Thing, Relative Thing and Mediating Thing. Party as defined here is a kind of Relative Thing, and the parties to the transaction are defined as two kinds of parties, in two distinct but related contexts (contexts being framed as Mediating Things).

The same individual person or organization will then both be a party to the Transaction (Agreement) and a party to each of the two Commitments. The nature of the transaction (and of contracts generally) is that the party that is the beneficiary of one Commitment will be the Obligor of the other, and vice versa – this being the underlying nature of the 'duality' relationship identified in REA.

CONCLUSIONS

We consider the notion of Claim as something seen in the round, separately from how this is seen from the perspective of one or other party to a transaction or agreement. As such Claim is co-extensive with the imbalance between the two related commitments in a transaction. Where the commitment is a commitment to transfer monies at some point in the future, the claim or imbalance may be accounted for, from the perspective of any one party to the transaction, as the difference between the asset position on one of the commitments and the liability position on the other commitment.

For debt contracts, one commitment is discharged early in the life of the contract, as the transfer of the principal amount from the lender to the borrower. In these contracts, the imbalance between the commitments is the same as the remaining commitment, and the imbalance at a point in time represents the outstanding debt at that point in time.

There is some question as to whether outstanding amounts of interest, which are not currently due, are considered to be a Claim in the terms intended here, but the illustrations in [1] suggest that they are. Whether these would normally be referred to as Debt remains a question to be considered. If not then there is a semantic difference between Claim as defined in these terms, and Debt.

For Equity contracts, some of the commitments made by the issuer are not measurable in monetary terms, being a commitment which gives the holder the right to vote. Other commitments do exist which may be measured in monetary terms, namely the conditional commitment to pay dividends if they are declared and the commitment in some jurisdictions to redeem the shares at par value if requested. It remains to be considered as to whether conditional commitments are to be considered as an imbalance between commitments when the conditions for their being claimable are not in effect (e.g. before a dividend declaration is made). Similar questions exist for preference share dividends.

The treatment explored here should be fully generalizable to all contracts, not just those related to transactions in the normal understanding of that concept. In order to flesh this treatment out fully, the questions about whether to consider there to be a claim and / or an and imbalance between commitments that are not currently due and claimable, including interest payment commitments, conditional ordinary share dividend commitments and so on. In the case of commitments such as the one that comes into force after a dividend has been declared, if Claim is considered to be the imbalance between claimable commitments at a point in time then the claim or imbalance will change upwards as well as downwards over time as different commitments start to exist (the dividend declaration) or come into force in the case of conditional commitments.

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