

The Conceptual Framework for Financial Reporting as a Domain Ontology

Full paper

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Abstract

The Conceptual Framework for Financial Reporting (CFfFR) was developed to provide guidance to users and preparers of financial reports and standards. However, general consensus within the accounting community is that the Conceptual Framework fails to achieve the stated intended purpose. This paper reports on an interpretive research study to understand the role, position, content and usage of the CFfFR, specifically how the Conceptual Framework could play the role of a domain ontology for financial reporting, and how this role determine the content contained in the Conceptual Framework. Following the Ontology Life Cycle Model we determined and represented key concepts for the CFfFR ontology as part of this work we developed a model to depict the decision process to report decision-useful information in financial reports. This paper therefore describes three contributions towards the CFfFR namely: 1) an hierarchical model depicting the positioning of the CFfFR as a domain ontology determining the role, purpose, usage and content of the CFfFR; 2) a model depicting the decision process for decision-useful information depicts the implicit domain knowledge about transformations from economic activities of an entity to financial reports; and 3) a first version of the CFfFR domain ontology using both the hierarchy and decision process models as input for the identification of key concepts and relations.

The CFfFR domain ontology could serve as basis for the interpretation and development of accounting standards for financial reporting since it contains formalizations of key concepts and relations described by the CFfFR. The CFfFR ontology could also assist in clarifying misunderstandings by educators and other users of the CFfFR about the concepts in the CFfFR as reported in literature, as well as resolve some of the identified differences given existing framework initiatives. If these problems are addressed it could contribute towards a more uniform understanding, interpretation and application of the CFfFR. This study does not pretend to resolve all or even most of the reasons for differences in international reporting. However, the contribution of this study is that it could contribute toward solving some issues obstructing the globalization of the CFfFR especially regarding the identification of inconsistencies and unintended meanings in the CFfFR.

Keywords

Accounting ontology, Domain ontology, Conceptual Framework, Accounting Standards, Financial Reporting.

Introduction

The Conceptual Framework for Financial Reporting (CFfFR) was developed to provide guidance to users and preparers of financial reports and standard setters (IASB 2010). The specified goals of the CFfFR are ambitious and include its usage to assist with the harmonization of regulations, standards and procedures, provide a basis to make decisions and assist with forming an opinion of financial statements prepared in compliance with International Financial Reporting Standards (IFRSs) (IASB 2010). General consensus within the accounting community is that the CFfFR fails to achieve the stated intended purpose that does not allow the CFfFR to override any statement should conflict in interpretation arises (IASB 2010). Since we agree with the original intention of the CFfFR, we embarked on an interpretive research study to understand the role, position, content and usage of the CFfFR as well as how it could fulfill its intended purpose. As part of this study we investigated the role and function of domain ontologies, take the position that one of the roles of the CFfFR should be that of a domain ontology for financial reporting, and that this position would determine the content contained in the CFfFR. Using the four level hierarchy of the Object Management Group (OMG) (Henderson-Sellers 2011; OMG 2008, 2014) and the work of Kühne (2005a, 2006a, 2006b) we established the model hierarchy that depicts the role of the CFfFR ontology.

Following the Ontology Life Cycle Model (Neuhaus et al. 2013) we attempted to determine key concepts for the CFfFR ontology. During this process we identified a lack of information on the decision process to report decision-useful information in financial reports. Within the accounting domain, this process is regarded as implicit knowledge but we required this knowledge for the CFfFR ontology construction. We therefore developed a model to depict the decision process and used this model to identify the key concepts and relations for the CFfFR ontology.

The contributions of this paper are therefore a model hierarchy to depict the role of a CFfFR as a domain ontology, a model to depicting the decision process used as background to the CFfFR and a first version CFfFR domain ontology. These contributions are of value to standard setters, researchers and practitioners within accounting.

This paper is structured as follow: background on the CFfFR, domain and domain ontologies are presented followed by a discussion on the ontology requirements phase that includes the role and position (model hierarchy) of the CFfFR ontology using the adopted method (Neuhaus and Vizedom 2013). During the ontology construction phases we develop the model to depict the decision process, as well as construct a first version CFfFR domain ontology. Finally we conclude with a discussion on the contribution and value of the study.

Background: Conceptual Framework for Financial Reporting

Background on the development of the CFfFR

In this section we briefly discuss the development of the current CFfFR. In reaction to the 1929 – 1933 depression, the monograph of Paton and Littleton (1940) influenced by *A Tentative Statement of Accounting Principles Underlying Corporate Financial Statements* (American Accounting Association 1936) (AAA), was the first institutional effort in the U.S.A. to develop a conceptual framework for business enterprises (Zeff 1999). The need for a globally acceptable conceptual framework and accounting standards increased as global markets developed after World War II (Barth 2013; Camfferman and Zeff 2009; Zeff 2012).

During 1973 accounting standard setting changed on both sides of the North Atlantic. The recommendations of the Wheat Committee initiated a new era in standard setting in the U.S.A. with the formation of the Financial Accounting Foundation (FAF), the Financial Accounting Standards Advisory Council (FASAC), and the Financial Accounting Standards Board (FASB) of standard setting (Storey and Storey 1998). Furthermore, the International Accounting Standards Committee (IASC) (Camfferman and Zeff 2009) was formed in 1973 to address the need to harmonize accounting standards. (Camfferman and Zeff 2009).

Between 1978 and 2000 the FASB published seven *Statements of Financial Accounting Concepts* (SFACs) (Storey and Storey 1998; Zeff 2012). The SFACs serve as the FASB conceptual framework. In 1989, the IASC published *The Framework* as a single document (Camfferman and Zeff 2009). The need for globally

accounting standards culminated in *The Norwalk Agreement* signed between the FASB and the International Accounting Standards Board (IASB) on September 18, 2002 (FASB and IASB 2002). In May 2005 the FASB and IASB announced a new joint agenda to revisit both organizations' conceptual frameworks (Bullen and Crook 2005).

On September 28, 2010, the FASB and IASB published the first stage of the joint conceptual framework project (IASB 2010). This first phase of the conceptual framework dealt with the objective and qualitative characteristics of financial reporting. The rest of the Conceptual Framework for Financial Reporting (CFfFR) (IASB 2010) was taken over from *The Framework* published by the IASC in 1989. The IASB proceeded with the revision process on the remainder of *The Framework*¹ included in the CFfFR. In June 2013 the IASB published a discussion paper (DP2013/1) requesting comments to be able to release an exposure draft of the revised sections during the first quarter of 2015 (IASB 2013).

Differences between conceptual frameworks

The reasons for the differences between the two conceptual frameworks of the IASB (CFfFR) and the FASB (CAFCs) are linked to their respective historical developments.² Barth (2008) provides four reasons why the FASB and IASB have different financial standards and conceptual frameworks, namely (1) that the Boards of FASB and the IASB must maintain their existing literature and must deal with their respective legacy standards and conceptual frameworks. The two different Boards are (2) under different political pressures (Barth 2008; Zeff 2007) and (3) have different priorities (Barth 2008) due to the influence of legal organizations such as the SEC (Zeff 2007). The two Boards have (4) developed different styles of setting standards over the years regarding the levels of detail guidance provided by the Boards (Barth 2008).

Further reasons include the role of culture (Ding et al. 2005; Papadaki 2005; Zeff 2007) and the use of accounting information within a culture (Macías and Muiño 2011). Cultural reasons are cited to be the main contributing factor for differences between reports based on the same accounting standards (Deegan 2014; Macías and Muiño 2011; Zeff 2007). The legal / regulatory system of a country also contributes towards differences between financial reports (Deegan 2014; Zeff 2007). Nobes (2014) provides a synthesis of 17 reasons why there are international accounting differences. These 17 reasons are summarized as external environment reasons, culture, accounting, and institutional structures explaining different accounting practices (Nobes 2014).

Language and law enforcement as well as policy options are also provided as reasons that can lead to international differences in IFRS interpretations (Nobes 2013). Zeff (2007) emphasizes the problems of interpretation, language and terminology as obstacles to converge accounting standards. These differences and the reasons for it needs to be taken into account when refining the CFfFR to fulfill its intended purpose.

The current status of the CFfFR

The current status of the CFfFR does not reflect the specified importance and purpose of the CFfFR as is clear in the statement from the IASB (2010, p. A19): “This *Conceptual Framework* is not an IFRS and hence does not define standards for any particular measurement or disclosure issue. Nothing in this *Conceptual Framework* overrides any specific IFRS.” The CFfFR is thus in status lower than International Financial Reporting Standards (IFRSs) and does not override any Standard or Interpretation (IASB 2013). Even in cases where there are conflicts between the CFfFR and IFRSs the IFRS prevails over the CFfFR (IASB 2010).

¹ The remaining sections of *The Framework* are: the elements of financial statements, recognition of the elements of financial statements, measurement of the elements of financial statements, and concepts of capital and capital maintenance (IASB 2010, chap. 4).

² Differences between financial reports may occur even if those financial reports are based on the same financial accounting standards (Deegan 2014; Ding et al. 2005; Nobes 2014; Zeff 2007). According to Deegan (2014, p. 151) “the standardization of accounting standards will not necessarily lead to standardization in practice.”

The current users, purpose and importance of the CFfFR

The stated purpose of the CFfFR is to “set out the concepts that underlie the preparation and presentation of financial statements” (IASB 2010, p. A19). These concepts should provide guidance to six different intended users³ and support eight usages (IASB 2010). The importance of the CFfFR for financial reporting is evident taking into account the comprehensive representation of the intended users within the accounting and economic environments.

The importance of the CFfFR for financial reporting is further emphasized when the eight usages as indicated by the CFfFR are considered, namely (IASB 2010):

1. assist in developing and reviewing IFRSs;
2. assist in promoting harmonization of;
 - a. regulations,
 - b. accounting standards, and
 - c. procedures;
3. provide a basis for reducing the number of alternative accounting treatments;
4. assist to develop national standards;
5. assist in applying IFRSs;
6. assist in dealing with topics for which an IFRS does not exist;
7. assist in forming an opinion of financial statements prepared in compliance with IFRSs;
8. provide information on the IASB’s approach to the formulation of IFRSs.

The importance of the CFfFR resides in its role to provide structure to the standard setting process and to provide fundamental concepts and a common set of terms and premises that financial accounting standards are based upon (Gore and Zimmerman 2007). The purpose of a conceptual framework for financial reporting is to ensure that financial accounting standards are “consistent with a unified theory of accounting” (Gore and Zimmerman 2007, p. 30).

Despite the stated importance and intended purpose of the CFfFR, the accounting community does not have one globally accepted conceptual framework for financial reporting (a global CFfFR) that provides fundamental concepts and a common set of terms and premises that are consistent with a unified theory of accounting (FASB and IASB 2010). Given the purpose and importance of the CFfFR, a global CFfFR could assist the IASB in achieving their mission “to develop a single set of high-quality, global accounting standards that are accepted worldwide” (Barth 2008, p. 1161). The need and search of a single set of global accounting standards and a global CFfFR are well documented (Barth 2007, 2008; Barth et al. 2008; Botzem 2012; Camfferman and Zeff 2009; Zeff 1982, 2010).

Background: Domain ontologies

The term *ontology* is popular in information systems and used to refer to anything from taxonomy, a domain vocabulary, a conceptual model, to a formal logic-based ontology (McGuinness 2003). Within information systems, an ontology is defined as a shared, formal, explicit specification of a domain, typically describing a hierarchy of concepts and associating each concept’s crucial properties with it (Broekstra et al. 2001). Gruber (1995) borrowed his definition for Ontology from philosophy (Guarino et al. 2009), and states that “...an Ontology is a systematic account of Existence” and Gruber (1993, p. 199) then defined ontology in information systems as “an explicit specification of a conceptualization”. “Conceptualization” as used by Gruber (1993) are the objects, concepts and other entities that are assumed to exist in some area of interest (domain) and the relationships that hold among them. A *domain ontology* is a formal conceptualization and thus an abstract and simplified view of the *domain* of interest as first mentioned by Guarino (1998). Several noteworthy implementations of domain ontologies exist nowadays including SNOMED CT (IHTSDO 2011), the Gene Ontology (Consortium 2000) and the list of biomedical ontologies on BioPortal (BioPortal n.d.). The common purpose of domain ontologies include a shared vocabulary or terminology of the domain, an explicit definition of terms or concepts and the relations between them, a common frame of reference for, for instance, markup of data sources and a

³The intended users of the CFfFR are the Board of the IASB, national standard setters, preparers of financial statements, auditors, users of financial statements and any other interested parties.

computable domain model of consensual domain knowledge (Guarino and Musen 2005; Guizzardi and Halpin 2008; Smith 2004).

The formalized representation of domain knowledge does not necessarily resolve all problems with interoperability. Work that specifically addresses ontology interoperability coined the notion of a *domain ontology* (Guizzardi 2006). The primary purpose of a *domain ontology* is the unambiguous identification and definition of key and meta concepts and relations in a domain through the use of foundational ontologies (Guizzardi 2006). Examples of such domain ontologies include Biotop (Beisswanger et al. 2009) and MarineTLO (ISL FORTH-ICS n.d.).

Related Work

A survey of published literature indicated a lack of discussions on the topic of the development of a domain CFfFR ontology. Teller proposed similar research (Masquefa and Pierre Teller 2010; Teller 2008), however our work deviates from Teller's notion of syntactic and semantic modelling. Masquefa and Teller's (2010) approach to develop an own formalism compromises the decidability and thus reasoning support of the formalism and we decided to adhere to the IS ontology standards namely DL and OWL.

Partridge (Partridge 2002a, 2002b) discussed some ontological choices necessary for the development of a conceptual framework from a philosophical perspective and our further research will refine this work given his findings.

The Digital Financial Reporting and XBRL (Extensible Business Reporting Language) community also initiated work on a Financial Report Ontology (FRO) (Bonsón et al. 2008; Charles Hoffman n.d.; Hoffman 2015). The focus of the XBRL project is however not the CFfFR, which is the departure point of this research. XBRL is an XML-based markup language used for the electronic exchange of business and financial data. The difference between XBRL and our work is that XBRL is mainly concerned with developing the meta-data level syntactic language from the bottom up, allowing for the 'tagging' of financial data. The semantics is mainly through the taxonomy, or formally – the is-a relationships. The formalized CFfFR Ontology discussed in this paper is concerned with formally representing the knowledge in a domain, namely that of the CFfFR. The language is 'logic-based' allowing for rich conceptual representation. Ultimately the concepts in such a domain ontology will be linked to the syntactic concepts of a markup language such as XBRL. The scope of this research paper is specifically the CFfFR (IASB 2010) and its role within the Financial Reporting Domain.

Several upper ontologies exist that were investigated for incorporation into our work. Refinement using a fundamental upper ontology such as DOLCE (Wonderweb 2011), BFO (BFO 2011), SUMO (SUMO n.d.) and SOWA (Sowa 2010) will be incorporated in future research. The identification of the appropriate upper ontology with the associated philosophical grounding is a study beyond the scope of this paper.

The Formalized CFfFR Domain Ontology

The CFfFR represents an abstract and simplified view of the most basic principles and postulates of financial reporting (Camfferman and Zeff 2009; Clark 2008; Zeff 1982), thus making it suitable to serve as an ontology for financial reporting (Figure 2). Furthermore, the current identified reasons for differences such as culture, language and legacy serve as an additional motivation to create an international standardized model for financial reporting.

A further advantage of ontologies as used within information systems is that computational ontologies formally model the structure of a system in a computer readable language based on formal logic (Baader et al. 2003; Guarino et al. 2009). Once the ontology is formalized and computerized it is clearly defined and can be tested for inconsistencies using logical inferences. The value of building an ontology of the CFfFR is that the concepts and relations in the ontology are clearly defined, thus providing a computer readable CFfFR that can be tested for inconsistencies and as an end-result is inherently consistent and unambiguous.

A formalized *domain ontology* for the CFfFR would assist in defining key concepts and relations unambiguously for an international community as is the case with existing domain ontologies in other domains discussed in the background section.

CFfFR Ontology Development

In order to formally model or capture the knowledge of a specified domain as well as the relevant entities and relations in the domain, the ontology engineer analyses and organizes the different entities of a system into its key concepts and relations between those concepts (Guarino et al. 2009). A taxonomy of the concepts⁴ of a system or domain forms the backbone of an ontology (Guarino et al. 2009). For this study the Ontology Life Cycle Model of Neuhaus et. al. (Neuhaus and Vizedom 2013) is adopted (Figure 1) and this paper reports on the initial results of the Requirements Development, Ontological Analysis and Ontology Design phases, which resulted in a first version CFfFR ontology. The natural text in the CFfFR documentation served as the main source of knowledge for the CFfFR ontology development.

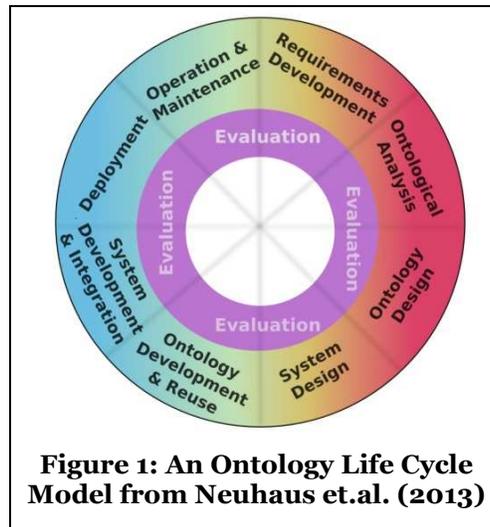


Figure 1: An Ontology Life Cycle Model from Neuhaus et.al. (2013)

Requirements Development Phase

During the Requirements Development Phase some expected or intended usages and interpretations of the ontology are elicited and examined (Neuhaus and Vizedom 2013). Several questions have to be answered during this phase such as why the ontology is needed, what is the expected or intended usage, the users of the ontology, its scope, competency questions and resources that needs to be considered.

As a starting point the CFfFR document (IASB 2010) was analyzed, specifically chapters such as the *Purpose and Status* and *Scope* in the introduction, *Chapter 1: The objective of general purpose financial reporting* and *Chapter 3: Qualitative characteristics of useful financial information*. Analyzing these sections clarified the *scope* of the CFfFR to be financial reporting or all the content, concepts and relations necessary to prepare financial reports as well as use, understand and interpret them given the identified users.

We identified two broad requirements related to financial reporting. The first requirement is the purpose of the CFfFR as stated above as to “set out the concepts that underlie the preparation and presentation of financial statements” (IASB 2010, p. A19). The second requirement is formulated as the “objective of general purpose financial reporting is to provide financial information about the reporting entity that is useful to existing and potential investors, lenders and other creditors in making decisions about providing resources to the entity” (IASB 2010, para. OB2). The second requirement is commonly known in the accounting community as the decision-useful purpose of financial reports.

In order to refine the requirements, it was necessary to investigate the role of the CFfFR as a model given the claims and statements made about the CFfFR, its usage and users. The four level hierarchy of the

⁴ We are aware of the discussions within the ontology domain about the definition of *concept* (Smith 2004), but engagement in this debate is beyond the scope of this paper.

Object Management Group (OMG) (Henderson-Sellers 2011; OMG 2008, 2014) was adopted and the work of Kühne (2005a, 2006a, 2006b) regarding type⁵ and token⁶ models was used to establish the model hierarchy of the existing financial reporting domain. The model hierarchy of the financial reporting domain was established and compared to the OMG four level hierarchy (Henderson-Sellers 2011; OMG 2008, 2014). The models higher up in the hierarchy provide a higher level of abstraction, providing a more universal abstraction of the elements provided in the model below it. Once the model hierarchy of the financial reporting domain (Figure 2) was determined it was possible to determine an ontology hierarchy of the financial reporting domain (Figure 2).

The ontology hierarchy of the financial reporting domain was derived depicting the role and relation of the CFfFR as a domain ontology towards accounting standards and economic realities.⁷

The function of Figure 2 is to indicate the focus of this research. The model hierarchy of the financial reporting domain (on the right) indicates how the financial reporting domain, analyzed from a model perspective, compares with the OMG Four Level Hierarchy. The CFfFR has the role of a meta-metamodel (M3) within the financial reporting domain.

On the left side of Figure 2, the relation of the ontology of the CFfFR with other elements in the ontology hierarchy of the financial reporting domain is indicated. The ontology of the CFfFR serves as a metamodel (M2) in relation to ontologies of accounting standards⁸ (M1) of the reality (the economic activities of a reporting entity). Within the ontology hierarchy, the particulars in the lower domain ontology (M1) must conform to the universals in the higher domain ontology (M2) in order for the ontology hierarchy to be inherently consistent. The intended role and purpose as stated in the background, as well as the role of the CFfFR ontology as metamodel depicted in Figure 2 portrays the intended usage of the CFfFR ontology and this provides the motivation for the initial execution of the next ontological development phases.

Ontological Analysis and Ontology Design Phases

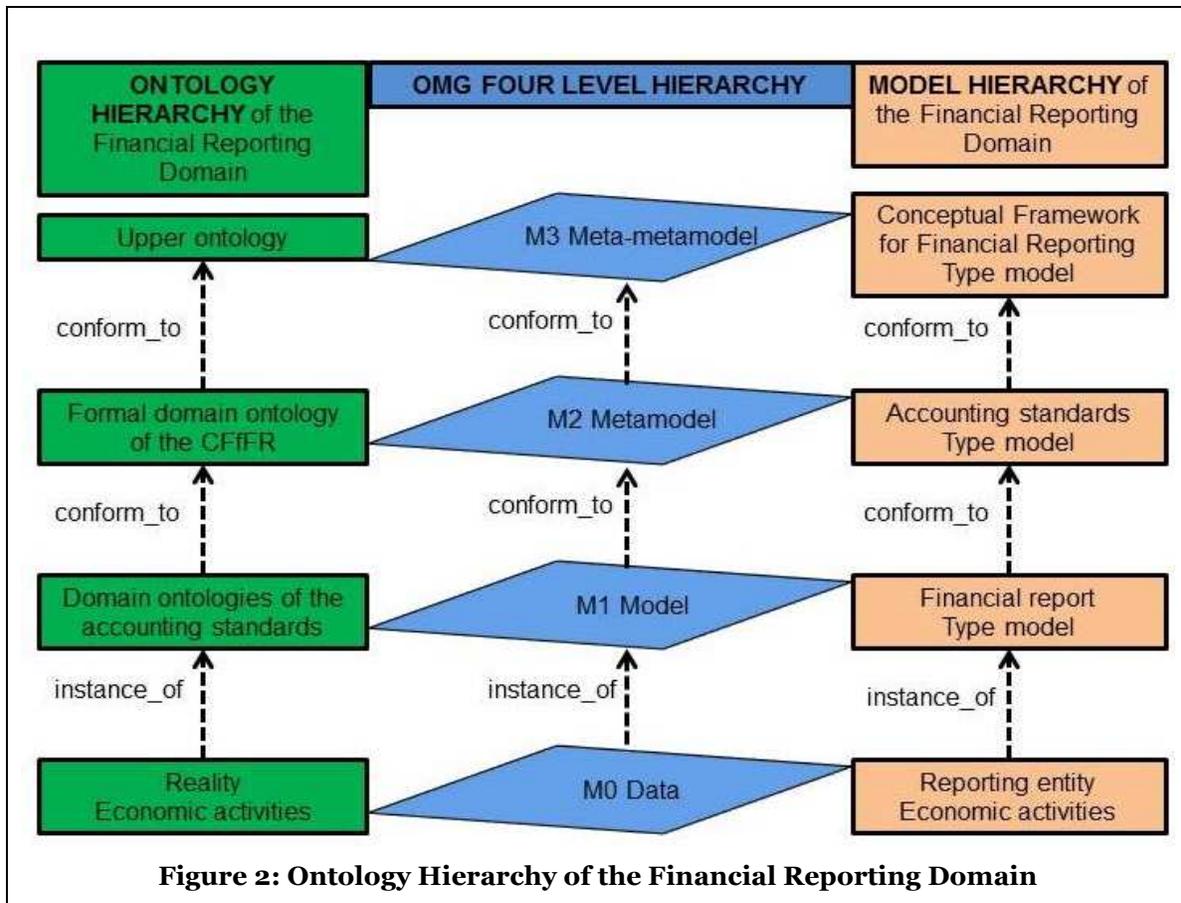
During the process of building the formal domain ontology of the CFfFR we followed the objective of general purpose financial reports and the purpose of the CFfFR as competency questions to guide us in identifying the key concepts and relations to be formalized. The Ontological Analysis Phase (Neuhaus and Vizedom 2013) has as purpose the identification of the key *entities* of the ontology namely the individuals, concepts and the relationships between them. The output of the ontological analysis phase should include specification of the significant entities within the scope and intended usage of the ontology, important characteristics of the identified entities, including relationships, disambiguating characteristics, properties important to the domain and activities within the scope of the intended usage, as well as the terminology used to describe entities (Neuhaus and Vizedom 2013). The Ontology Design Phase are concerned with the representation language (we chose OWL 2.0 (W3C OWL Working Group 2012)), as well as foundational or upper ontology (initial work has been done to link the identified key concepts to the DOLCE foundational ontology (DOLCE 2011; Gangemi et al. 2002)). The key concepts in the CFfFR are primarily Social Objects given the DOLCE categories.

⁵ Type models collect concepts and their universal object properties to classify objects and draw conclusions based on the collection. The universal aspects of an original's elements are captured in a type model (Kühne 2005b). When the "representedBy" relationship between the original and the model is transitive, then the model is a token model (Kühne 2005b).

⁶ Token models are used for capturing system configurations and are used as the basis for simulations. Singular aspects of the original's elements are captured with a token model. Token models are also referred to as snapshot models as they capture only a single configuration of a complex system (Kühne 2005b). A type model is also called a "schema model or a "classification model."

⁷ The details of the study are reported on elsewhere and falls outside the scope of this paper, but the results are depicted in Figure 2. This study focuses on the building of a formal domain ontology of the CFfFR.

⁸ Domain ontologies of accounting standards do not form part of this study and will be pursued at a later stage.



The CFfFR documentation (IASB 2010) served as the starting point for the identification of the CFfFR ontology entities. Previous work formalized the basic elements as key concepts contained in the statement of financial position as specified by the CFfFR (Gerber et al. 2014). However, from an ontology engineering perspective, it was difficult to identify all the key concepts from the CFfFR document (IASB 2010). The use of terminology is often inconsistent and ambiguous, for instance, an *asset*, which is a key concept, is defined both as *a resource under control of an entity*, as well as *a basic element in a financial report*, which clearly cannot be the case. Another example is, for example, *financial report* and *financial statement*, which are often used as synonyms but upon careful scrutiny, there are distinct differences: *financial statements* are contained within a *financial report*.

Furthermore, the current CFfFR document contains descriptions and sections that could arguably be regarded as secondary to the identified scope of the CFfFR ontology. From an ontology engineering perspective, the document on its own does not contain enough detail to construct precise ontology assertions. Since the scope of the CFfFR is financial reporting, we included example financial reports (using a bottom-up approach) to assist with identifying key concepts but still experienced significant challenges to identify key concepts and relations and construct precise ontological assertions. We found that significant implicit and common domain knowledge is required to understand and interpret the CFfFR, IFRSs and financial reports.

An example of implicit domain knowledge not contained in the CFfFR or IFRSs documents is the process that is followed from when an economic activity takes place until such stage when that economic activity is reported in the financial report, either connected to a monetary value or not. The key concepts identified are the minimum to support the selection of economic activities that provide decision-useful information for the users are:

- Objective of financial reports (serves as competency question) (IASB 2010, chap. 1);

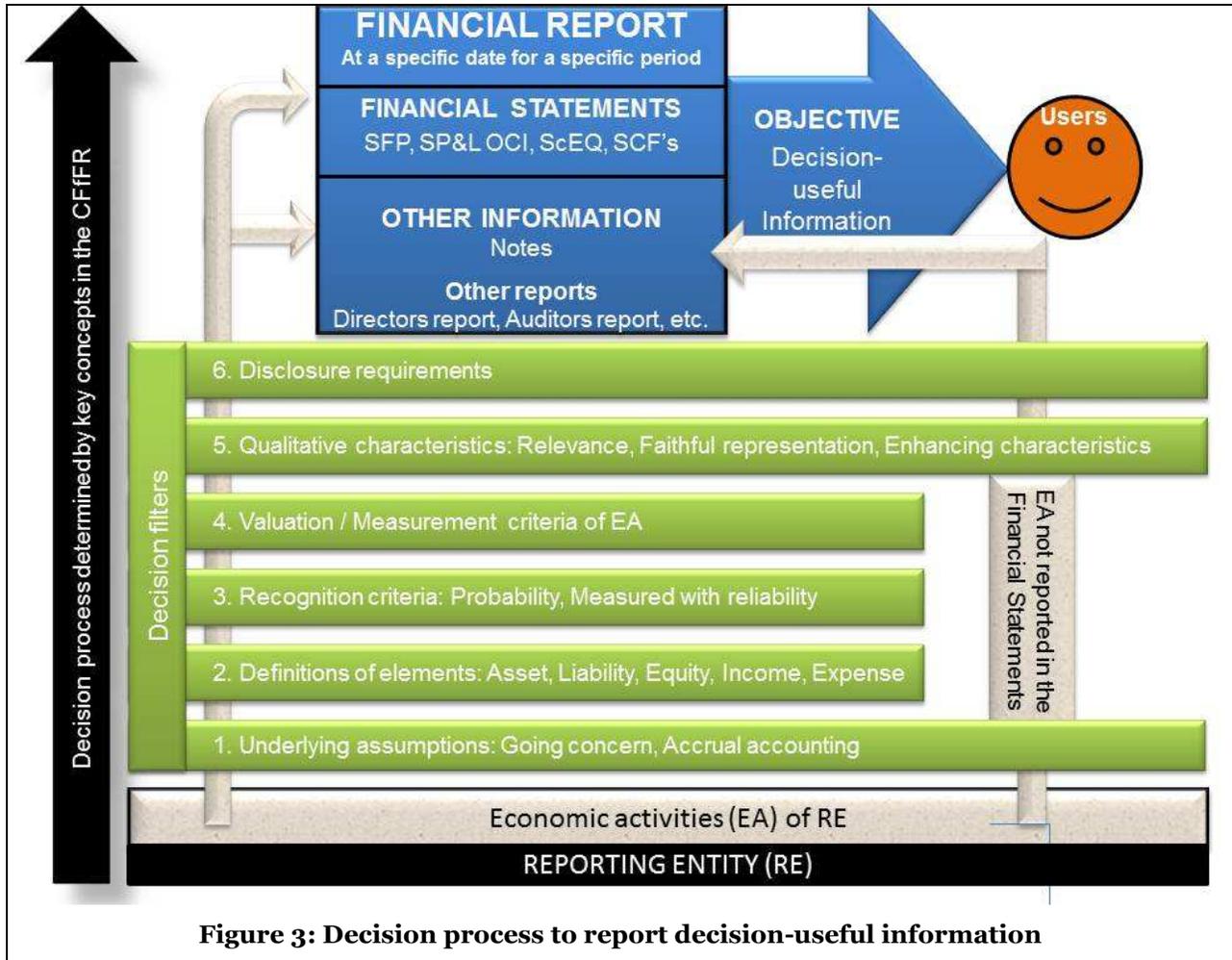
- Purpose of the CFfFR (serve as competency question) (IASB 2010, chap. Introduction)
- Financial Report (used ambiguous with financial statements in the CFfFR);
- Financial Statements (specific financial statements not included in the CFfFR, included in IAS1);
- Other information and reports (not included in the CFfFR);
- Reporting date and reporting period (not included in the CFfFR);
- Notions of time period and time instance (linked to accrual accounting and reporting date, not included in the CFfFR);
- Users of financial reports and the CFfFR (IASB 2010, chap. 1 and Introduction);
- Reporting entity (RE) (in process of development);
- Economic activity (EA) (not explicitly defined in the CFfFR);
- Going concern (IASB 2010, chap. 4.1);
- Accrual accounting (IASB 2010, para. OB17);
- Definitions of the elements (under revision) (IASB 2010, chap. 4.1–4.33);
- Recognition criteria (IASB 2010, chap. 4.37–4.49);
- Measurement criteria (under revision) (IASB 2010, chap. 4.54–4.56);
- Qualitative characteristics of decision-useful information (IASB 2010, para. QC);
- Disclosure requirements (in process of development);
- Economic activities reported in the financial report, but not included in the financial statements (not included in the CFfFR).

During the decision process some of the key concepts function as filters (for the purpose of this study they are called decision filters) in order to determine what, when and how (Deegan 2014) an EA should be reported in the financial report. These decision filters are applied in a certain order, thus the numbering in the illustration in Figure 3.

The first piece of assumed domain knowledge that was identified from an ontology engineering perspective, and which created a difficulty to formalize was that elements are not reported in the financial statements. What is reported is a summation (Σ) of the *measurement* (in some cases after a complex valuation process), of all the economic activities, categorized according to element characteristics and definitions. A statement of financial position does not present the assets (the actual instances) of a reporting entity, but a sum (Σ) of the value of the assets.

The decision process determined by key concepts in the CFfFR functions as follows: The economic activities of a reporting entity are screened through the decision filters starting with firstly determining if the reporting entity is a going concern. If the entity is not a going concern the criteria regarding valuation and measurement would change. As a basis for accounting the accrual principle (accrual accounting) is adopted and all economic activities must pass through decision filter 1 to be included in the financial report. Certain economic activities are reported in the notes and other information without passing through filters 2, 3 and 4. The information regarding this information must be useful for decision-making and must comply with disclosure requirements.

In order to reflect and make explicit the above mentioned assumed domain knowledge, a model for the decision process through the six filters in the sequential order was developed. The model was informally validated and refined using accounting domain experts. In order for the formal domain ontology of the CFfFR to support the competency questions all the concepts and relations included in the decision process to provide decision-useful information (Figure 3) to the users must be explicitly and unambiguously asserted in the CFfFR Ontology.



Ontology Construction

The results on the initial execution of the ontology life cycle phases (Neuhaus and Vizedom 2013) are a first version CFfFR ontology. The decision process model allowed us to identify an initial set of key concepts and relations of the CFfFR. A screenshot of this ontology is depicted in Figure 4 and the ontology specification as well as the ontology is available for download from <https://sites.google.com/site/ontologyprojects/accounting>.

For the purposes of this study, we constructed a first version ontology of the CFfFR that could serve as an upper domain ontology given its position, purpose and scope, and its representation of the implicit domain knowledge assumed by the accounting profession. Further research studies would formally validate this ontology against its requirements.

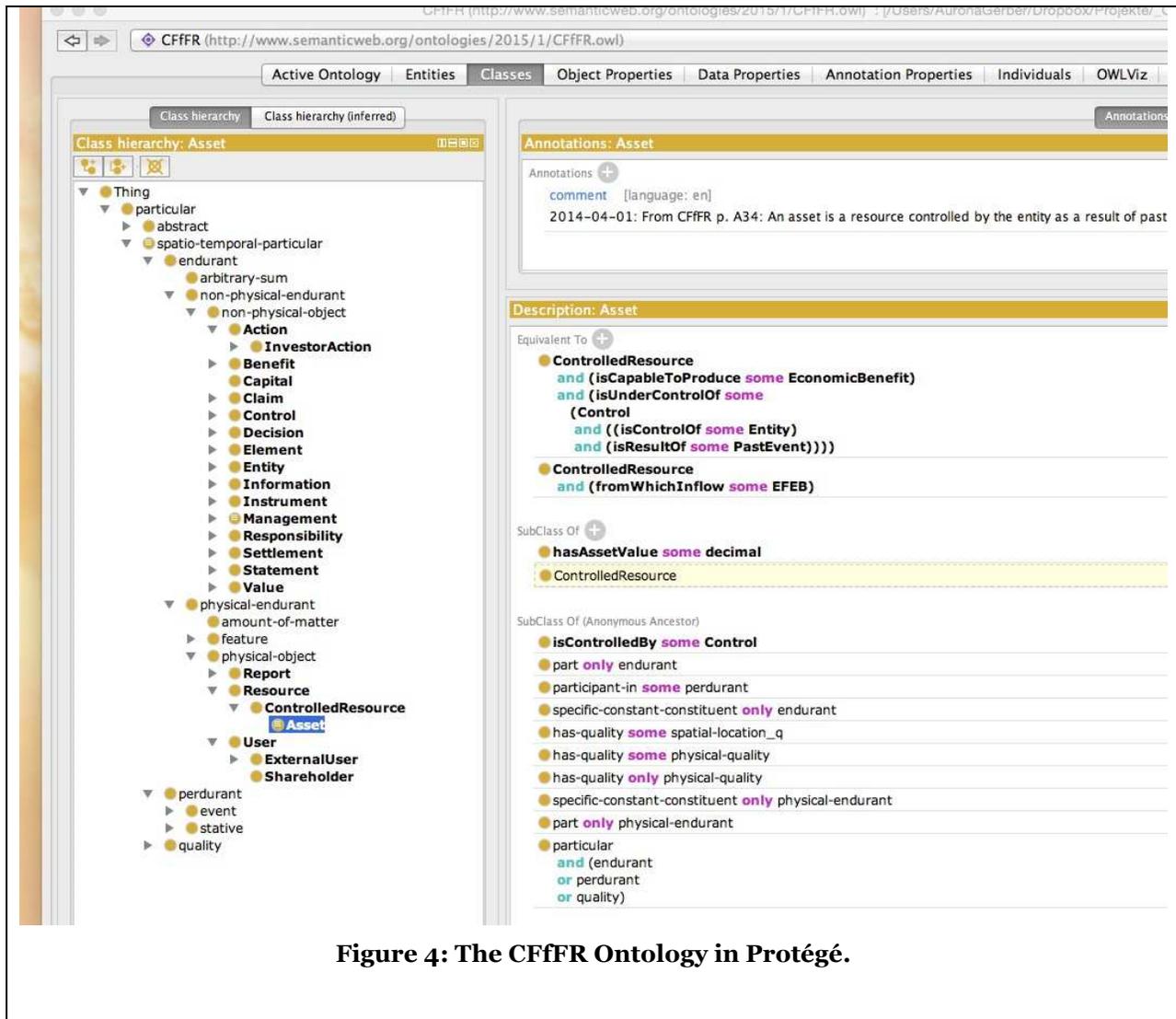


Figure 4: The CffFR Ontology in Protégé.

Contribution and Conclusion

This paper describes 3 contributions towards the CffFR:

1. The positioning of the CffFR as a domain ontology as depicted in **Error! Reference source not found.** Figure 2 assist with determining the role, purpose, usage and content of the CffFR.
2. The model depicting the decision process for decision-useful information depicts the implicit domain knowledge about transformations from economic activities of an entity to financial reports. This model was used to assist with the identification of key concepts and relations in the CffFR ontology.
3. The first version of the CffFR ontology was constructed using both the ontology hierarchy and decision process models as input for the identification of key concepts and relations.

The CffFR ontology could serve as basis for the interpretation and development of accounting standards for financial reporting since it contains formalizations of key concepts and relations described by the CffFR. Using existing ontology standards and technologies such as the W3C OWL 2.0, the CffFR could serve as a standard formal representation of the knowledge in the CffFR.

The CFfFR ontology could also assist in clarifying misunderstandings by educators and other users of the CFfFR about the concepts in the CFfFR as reported by Barth (2008), as well as resolve some of the identified differences given existing framework initiatives. If these problems are addressed it could contribute towards a more uniform understanding, interpretation and application of the CFfFR.

Cultural differences are addressed when a theoretical system are presented in a consistent and logical manner (Antonites 2006). This study does not pretend to resolve all or even most of the reasons for differences in international reporting indicated in the background. However, the contribution of this study is that it could contribute toward solving some issues obstructing the globalization of the CFfFR especially regarding the identification of inconsistencies and unintended meanings in the CFfFR.

The language reasons for differences are addressed by formulating the CFfFR in a formal language using Description Logics (DL's) providing a more exact presentation of the concepts and relations in the CFfFR. As formal logic forms the basis of DL the formal domain ontology of the CFfFR should be inherently consistent.

With regards to accounting information systems, a formalized ontology is a computerized model that could be integrated into accounting information systems. This could assist with decision support, especially if combined with the reasoning support available for OWL 2.0 ontologies (Tsarkov and Horrocks 2006).

Within the paper we report on initial work with regards to a large research study about the role, position, content and usage of the CFfFR for the accounting discipline as well as how it could fulfill its stated intended purpose.

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