REA-based Enterprise Business Domain Ontology Construction

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***Abstract*—Business domain ontology construction is of great significance to improving business modeling and knowledge management. Based on REA business process modeling method and integrated with enterprise strategy information, the paper proposes a REA-based two-layer enterprise business information architecture. And then the business domain ontology infrastructure is constructed in OWL DL language. To demonstrate and implement the method and architecture, an example of tobacco trading company is taken. The proposed architecture abstracts enterprise business information from strategic and operational level, covering the main business elements of enterprise operation. By adopting the business domain ontology the paper provides a foundation for the conservation and reuse of business modeling and improves enterprise business modeling knowledge management.**

***Index Terms*-business modeling, REA model, business domain ontology, OWL**

I. Introduction

With the rapid developing of information technology, the relevant methods and theories of information and business modeling have also been improved greatly. The dominant methods of business modeling such as process-oriented and object-oriented approaches have played an important role in establishing information system, and have great significance to improving the enterprise business and conceptual modeling. However, based on specific information system, these modeling methods face some inevitable problems such as objected to specific application, definitions and symbols inconsistent and so on. On the one hand, the conceptual model can not be reused in future information applications after the information system implemented; on the other hand, there are no formal definitions and standards for the established model, which caused that model lacks of consistency detection, and the model's validity and normative are under suspicion. So how to make the model universal and expansible, and to be a kind of enterprise knowledge that can provide common reference and reuse for different participants have became one of the concerns in conceptual modeling research area.

Recently, ontology has been studied widely. The most famous definition of ontology is by Studer et al: "ontology is an explicit specification of conceptualization" [1]. Generally speaking, ontology is used to describe concepts and concepts' relationships in a domain or an even wider range. Ontology makes these concepts and relationships have unified and clear definition in the domain. Constructing ontology can improve the sharing of knowledge and interoperability of heterogeneous systems and participants. Therefore using ontology to unify the definition and description of the enterprise business concept and their relationship takes great significance for enterprise business modeling and knowledge management.

Based on the value-add chain of enterprise, McCarthy studied kinds of economic activities, and proposed the REA framework in the field of accounting information system [2]. Since the REA framework has been published in peer-reviewed accounting journals, it has been widely analyzed and proven to be a faithful representation of the objects and relationships in enterprise business modeling domain. After years of developing and improving, the REA framework has been widely accepted as a framework for designing enterprise information systems infrastructure. At the same time, McCarthy et al. have been studying on how to construct enterprise ontology through REA model [3, 4, 5]. The studies show that the REA model could give excellent support in establishing business domain ontology.

In this paper, we firstly analysis REA model from basic and extent model perspective, and then a two-layer architecture is proposed. The paper also studies how to constructing REA-based enterprise business domain ontology with OWL. In section 2, REA model and some extended models have been introduced and analyzed; based on REA model, a two-layer enterprise information architecture is introduced in section 3; section 4 studies the OWL formalization and representation of the architecture; in section 5 we take a municipal Tobacco Monopoly Bureau in China as an example to study and implement our modeling method and construct a brief ontology; and the conclusion is give in the end.

II. REA Modeling

The main purpose of REA modeling is to indentify the enterprise's resources, events, agents and their inter-relationship, and to represent and reserve the related content of business event according to their original semantic. Initially, REA model was based on accounting information systems, and focused on studying the related business activities of enterprise value chain [2]. It's proved that the model has advantages in representing enterprise business and knowledge. After years of

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developing, REA has formed its own architecture and modeling methodology.

A. The basic REA model

The foundation of adopting REA to model enterprise business is that enterprise production and operation function is composed of a series of separated business processes. A business process consists of several business events, and business events usually involve in several resources and agents. Therefore, the first step for modeling enterprise production and business is to find out enterprise business processes, and then establish REA

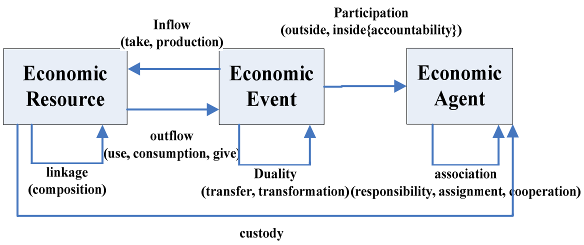

Figure 1. framework of basic REA model

model for each business process. Analyzing from the business process, REA modeling method regard “business event” as the basic unit, and standardize the flow of business processes. In the Initial REA model, the study focused on the related business operations of enterprise’s value chain and financial flows, so enterprise’s business operations are divided into three categories: resources, events, participants [2]. The whole structure of basic REA model is shown in Fig. 1.

1. **Resource**: a thing that is scarce and has utility for economic agents and is something that users of business applications want to plan, monitor and control. For example, a product or a service is a resource.

2. **Event**: represents either an increment or a decrement in the value of economic resources that are under control of the enterprise. For example, invoicing is an event that involves the sale of products or services.

3. **Agent**: is an individual or organization capable of having control over economic resources, and transferring or receiving the control to or from other individuals or organizations. Agent is an economic representative such as a customer or an employee.

The relationship between these entities and concept can be summarized by the following four:

- **Stock-flow** relationships describe the connection between Economic Resources and Economic Events. An economic event results in either an inflow or an outflow of resources. Inflows and outflows are further specialized depending on the nature of the duality relationship.
- **Duality**: the condition resulting from one event requiring a complementary event (the dual) to complete a transaction. For example, an invoice leads to one or more collections.
- **Participation**: relationships describe the agents involved in an Economic Event. Inside and outside participation are two different subtypes of this relationship representing the two roles of Agents in the participation relationships. The same agent (person) can be an inside agent (employee) for one event and an outside agent (customer) for another event.

The basic REA model clearly identifies and defines elements and relationships in the enterprise value-added process, and does a great favor in the guidance and support of business process analysis and modeling.

B. The extended REA model

Basic REA model regarded enterprise's value chain as the core, and focused on the enterprise's economic activities. On the one hand REA basic model carried out brilliant classification and description of enterprise's economic activities; however, on the other hand basic REA model was weak in the expression of non-economic business activities in enterprise operation. Therefore, in following studies, Geerts and McCarthy extended the basic model, and introduced a series of extended REA model [4]. One of those typical models is shown in Fig.2.

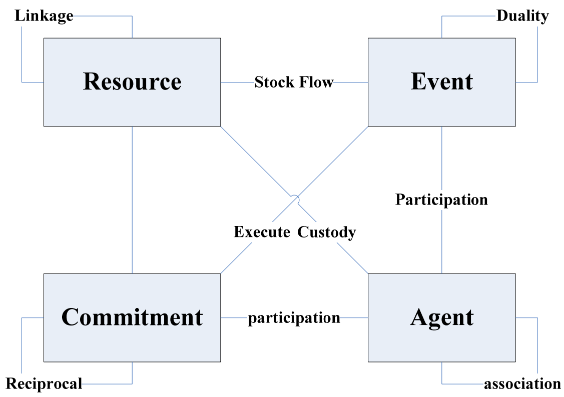

Figure 2. framework of extended REA model[6]

Comparing with the original model, the extended model is in-depth detailed, mainly in the following aspects [4].

1. Association: Association relationships describe dependencies between agents. We distinguish between three different types of association relationships: responsibility, assignment, and cooperation. The responsibility relationship describes a dependency between two inside agents, and McCarthy defined it as follows: “Responsibility relationships indicate that higher level units control and are accountable for activities of subordinates.” [2] It is important to note that an agent does not have to be a person but can instead be a department, division or another organizational unit; thus, the responsibility relationship is the vehicle for describing the existing organizational structure. The assignment relationship describes dependencies between internal and external agents like a salesperson being assigned to specific customers or a buyer working with specific vendors. Finally, the cooperation relationship describes existing dependencies between external agents such as a customer being a subsidiary of a vendor or a joint venture existing between two vendors.

2. Linkage: Linkage relationships describe dependencies between economic resources. An important

type of linkage relationship is the composite or part-whole relationship. A composite relationship defines a resource (whole) as an aggregation of two or more other resources (parts). For example, a hard disk, a floppy drive, a monitor, etc. can be defined as parts of a computer (whole). Linkage relationships exist that don't fit the part-whole structure (non-aggregation relationships). An example of such a relationship is the description of resources that are used as substitutes for another resource.

3. Custody: Custody relationship describes the internal agent being responsible for a specific resource like the custody relationship between a warehouse clerk and the items stored in the warehouse.

4. Commitment: Commitment is an important economic phenomenon, defined as an "agreement to execute an economic event in a well-defined future that will result in either an increase of resources or a decrease of resources." [7] The reciprocal relationship between two commitments can be abstracted as contract and schedule, the definition of which depends on the ultimate nature of the economic exchange. A transfer executes a contract while a transformation executes a schedule.

Two additional relationships are needed to integrate the commitments with the exchange description: reserves and partner. Reserve is a special kind of stock-flow relationship that describes the scheduled inflow and outflow of resources. A sales order results in a reservation of the finished goods to be delivered, while a production order results in a scheduled completion of finished goods. Finally, the partner relationship is a special kind of participation relationship that describes the outside agents participating in the commitments. We define the partner relationship as a subtype of the outside relationship [4].

On the basis of original model, the extended model includes the enterprise's schedule which has not yet taken place but has been confirmed. It greatly enhances the business modeling ability.

C. the knowledge fundation of REA

With the development of information technology, how to achieve enterprise knowledge management has become a focus of study. Current studies on knowledge reserve and representation focus on the establishment of knowledge ontology. According to Sowa's ontology theory, McCarthy made extensive analysis on constructing REA ontology. It has been proved that REA model has a good theoretical foundation in knowledge ontology construction [8].

According to Sowa's knowledge structure [9], McCarthy classified REA ontology as: the operational infrastructure conceptualizes the actual economic phenomena, both current and future; the knowledge infrastructure conceptualizes the abstract phenomena that characterize the actual economic phenomena [4]. In this model, the operating structure is the REA and its extended model introduced above. In REA ontology, type images are used to represent the intangible structure of economic phenomena. For constructing type images we use typification, an abstraction commonly used in data modeling. Typification captures descriptions that apply to a group of actual phenomena. For example, the definition of a lion as a roaring member of the cat family applies to a large number of actual lions. Also important is that the definition of a lion is preserved when lions no longer exist. In the REA ontology, type-images are used to define abstractions of economic phenomena, and this is a distinction that allows us to construct a knowledge infrastructure above the transaction components (which constitute an operational infrastructure) that were described previously.

In Fig.3 we integrate the operational and knowledge infrastructures of the REA ontology. The knowledge infrastructure contains four different types of images:

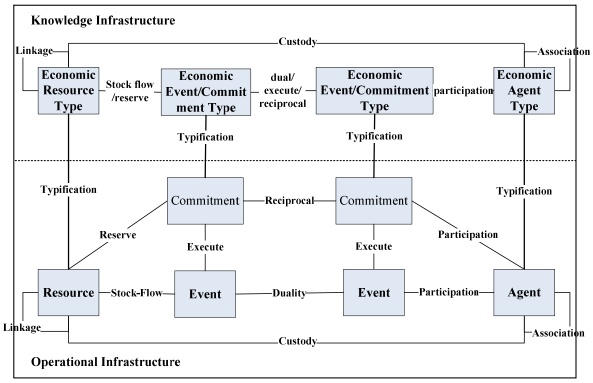

Figure 3. knowledge infrastructure of REA

Economic Resource Type, Commitment Type, Economic Event Type, and Economic Agent Type. With this infrastructure, we can capture most of the enterprise economic phenomena and extract them as knowledge.

III. REA-BASED ENTERPRISE BUSINESS INFORMATION ARCHITECTURE

The proposal of REA solved the modeling problem of value-added chain in the enterprise's operation process. This modeling approach focused on the operational level of enterprises business and not covered the strategic level, but in the actual operation, all the enterprise business operations serve for achieving enterprise's strategy. Uschold introduced an enterprise ontology whose basic components are marketing, enterprise, strategy, activity [10]. Neaga and Harding studied the information model components of manufacturing enterprise and proposed a business framework [11]. McCarthy also made study on it. Based on the holistic information framework which was introduced by Neaga et al. [11] and combined with REA model, in this paper we proposed a two-layer enterprise information architecture as in Fig.4.

The architecture is divided as the strategic layer and operational layer. The strategic layer describes the internal and external macro-environment of enterprise such as the enterprise overall resources, strategies, organizations and so on. Based on REA model, the operational layer takes the transactions in business process as core and models the enterprise business activities. The strategic level contains 7 components as following.

Resource: The resource describes the entities and mechanisms that enable a process to be executed. It is the foundation of enterprises. Only control over some resources, enterprises can add more value and achieve enterprise strategies and targets. Therefore the type and quantity of the enterprise resources determine the enterprise's survival and development.

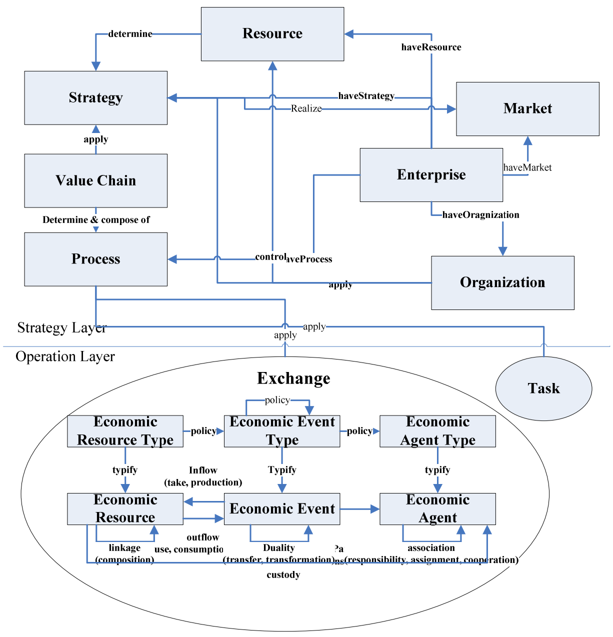

Figure 4. knowledge infrastructure of REA

Enterprise: The enterprise captures how the process is undergone and controlled, and where the process is located, or the area of responsibility where the process takes place [11].

Organization: Representatives of the organizing and managing manner of the enterprise's staff and assets.

Strategy: Strategy is associated with plans and programs that are employed toward the enterprise goals [12]. The enterprise strategy defines the mainstream the company is following. Before performing the analysis of a particular managerial action, it is essential to understand the reasoning path the manager has done. The employees, clients and business partners should be kept informed about the enterprise present and future. Therefore, the enterprise mission, goals and strategic programs should be communicated and diffused, at least within the enterprise [12].

Value Chain: The value creation of enterprise is constituted through a series of activities. These activities can be divided into basic activities and supplementary activities. Basic activities include internal logistics, production, external logistics, marketing, sales, and service. Supplementary activities include procurement, technology development, human resources management and enterprise infrastructure. These separated but interrelated production and operation activities constitute a dynamic process of creating value that is value chain.

Process: Process is a sequence of actions resulting in a product or a service. Each process can be characterized by a unique value-added contribution to the entire enterprise business cycle. [12]

Market: Market is not only on behalf of enterprise external environment, but also the ultimate manifestation of the value creation.

The seven components of enterprise strategy have mutual influence, and determine the purpose and developing direction of the enterprise. It is the core of all activities of enterprise. The detail information about those concept and their relationships are shown in Fig.4. We introduce the REA framework as operational layer infrastructure to support business information modeling. The definitions of the elements in operation layer follow with the original REA model.

The architecture combines enterprise strategy with business operations components to cover the enterprise information and business modeling. Strategic layer is relevant to the whole enterprise's strategy, while operational layer to the general business activities of enterprises.

IV. ONTOLOGY FORMALIZATION OF THE ARCHITECTURE

In order to be effectively maintained and reused, the business information architecture should be extracted and constructed as knowledge ontology. Ontology is based on Description Logic, which is an object-based formalization for knowledge representation and also known as the concept of express language or terminology logic. It is a first-order logic decidable subset with appropriate semantics definition, and has a strong ability to express. Description logic has two basic elements, namely concepts and relations (Role). The former is explained as a subset of the field and the latter is explained as the relationship between individuals of the ontology, which is a kind of binary relation on the field collection. Therefore using ontology to describe business process provides a mathematical foundation for model maintenance, reasoning, and consistency detection. In order to express ontology effectively, W3C proposed the OWL language, which has become an international standard semantic Web language [13]. The OWL Web Ontology Language is designed for use by applications that need to process the content of information instead of just presenting information to humans. OWL facilitates greater machine interpretability of Web content than that supported by XML, RDF, and RDF Schema (RDF-S) by providing additional vocabulary along with a formal semantics [14]. In this paper we introduce the OWL DL as the description language for the enterprise business domain ontology.

Generally speaking, there are two steps to create ontology, define concepts; define concepts' relationships also called axiom. In this paper, the definition of all concepts and relations have been shown and described; here we just study how to formalize our business architecture with OWL DL language. For the space reason we will just choose some typical elements to demonstrate.

The main formalization process is to identify the disjoint classes and related object properties. The concept in same layer and same level are pairwise disjoint and for the direct relationship with the concept object properties and inverse properties should be created. To formalize the strategic layer, elements *strategy* and its related axioms can be formalized as OWL ontology in TABLE I:

McCarthy et al. have done much work for the knowledge foundation of REA business domain ontology, and three basic axioms have been proposed for REA ontology [4].

- Axiom1 – At least one inflow event and one outflow event exist for each economic resource;

TABLE II.
THE FORMALIZATION DESECRIPTION OF STRATEGY

Formalize the *Strategy* concept

```
<owl:Class rdf:ID="Strategy">
    <owl:disjointWith>
      <owl:Class rdf:about="#Actvity"/>
    </owl:disjointWith>
    <owl:disjointWith>
      <owl:Class rdf:about="#Enterprise"/>
    </owl:disjointWith>
    <owl:disjointWith>
      <owl:Class rdf:ID="Exchange"/>
    </owl:disjointWith>
    <owl:disjointWith>
      <owl:Class rdf:about="#Market"/>
    </owl:disjointWith>
    <owl:disjointWith>
      <owl:Class rdf:about="#Organization"/>
    </owl:disjointWith>
    <owl:disjointWith>
      <owl:Class rdf:about="#Resource"/>
    </owl:disjointWith>
</owl:Class>
```

Formalize related association

```
<owl:ObjectProperty rdf:ID="applyValueChain">
    <rdfs:domain rdf:resource="#Value_Chain"/>
    <owl:inverseOf>
      <owl:ObjectProperty
rdf:ID="inverse_of_applyValueChain"/>
    </owl:inverseOf>
    <rdfs:range rdf:resource="#Strategy"/>
  </owl:ObjectProperty>
  <owl:ObjectProperty rdf:about="#determine">
    <rdfs:range rdf:resource="#Strategy"/>
    <rdfs:domain rdf:resource="#Resource"/>
    <owl:inverseOf
rdf:resource="#inverse_of_determine"/>
  </owl:ObjectProperty>
  <owl:ObjectProperty rdf:about="#Realize">
    <owl:inverseOf rdf:resource="#inverse_of_Realize"/>
    <rdfs:range rdf:resource="#Market"/>
    <rdfs:domain rdf:resource="#Strategy"/>
  </owl:ObjectProperty>
```

conversely inflow and outflow events must affect identifiable resources.

- Axiom 2 – All events effecting an outflow must be eventually paired in duality relationships with events effecting an inflow and vice-versa.
- Axiom 3 – Each economic event needs to have at least one provide and one receive relationship with an economic agent.

Based on the research, we will formalize the REA knowledge infrastructure element *Event resource type* firstly.

TABLE I.
THE FORMALIZATION DESECRIPTION OF EVENT RESOURCE TYPE

Formalize the *Economic Resource Type* concept

```
<owl:Class rdf:about="#Economic_Resource_Type">
    <owl:disjointWith>
      <owl:Class rdf:about="#Economic_Event"/>
    </owl:disjointWith>
    <owl:disjointWith>
      <owl:Class rdf:about="#Economic_Agent_Type"/>
    </owl:disjointWith>
    <owl:disjointWith>
      <owl:Class rdf:about="#Economic_Event_Type"/>
    </owl:disjointWith>
    <owl:disjointWith>
      <owl:Class rdf:about="#Economic_Agent"/>
    </owl:disjointWith>
    <owl:disjointWith rdf:resource="#Commitment"/>
    <owl:disjointWith>
      <owl:Class rdf:about="#Commitment_Type"/>
    </owl:disjointWith>
</owl:Class>
```

Formalize related association

```
<owl:ObjectProperty rdf:about="#policy">
    <owl:inverseOf rdf:resource="#inverse_of_policy"/>
    <rdfs:domain>
      <owl:Class>
        <owl:unionOf rdf:parseType="Collection">
          <owl:Class rdf:about="#Economic_Agent_Type"/>
          <owl:Class rdf:about="#Economic_Event_Type"/>
          <owl:Class
rdf:about="#Economic_Resource_Type"/>
        </owl:unionOf>
      </owl:Class>
    </rdfs:domain>
    <rdfs:range>
      <owl:Class>
        <owl:unionOf rdf:parseType="Collection">
          <owl:Class rdf:about="#Economic_Agent_Type"/>
          <owl:Class rdf:about="#Economic_Event_Type"/>
          <owl:Class
rdf:about="#Economic_Resource_Type"/>
        </owl:unionOf>
      </owl:Class>
    </rdfs:range>
  </owl:ObjectProperty>
```

For formalizing the elements of basic REA model, we take *Event* as an example, the related concepts and relationships in OWL are shown in TABLE III.

TABLE III.
THE FORMALIZATION DESCRIPTION OF EVENT

Formalize the *Event* concept

```
<owl:Class rdf:about="#Economic_Event">
    <owl:disjointWith
rdf:resource="#Economic_Resource_Type"/>
    <owl:disjointWith rdf:resource="#Commitment"/>
    <owl:disjointWith>
      <owl:Class rdf:about="#Commitment_Type"/>
    </owl:disjointWith>
    <owl:disjointWith
rdf:resource="#Economic_Resource"/>
    <owl:disjointWith rdf:resource="#Economic_Agent"/>
    <owl:equivalentClass>
      <owl:Class>
        <owl:unionOf rdf:parseType="Collection">
          <owl:Class rdf:ID="Decrement_Economic_Event"/>
          <owl:Class rdf:ID="Increment_Economic_Event"/>
        </owl:unionOf>
      </owl:Class>
    </owl:equivalentClass>
</owl:Class>
```

Formalize related association

```
<owl:ObjectProperty rdf:about="#outflow">
    <rdfs:domain rdf:resource="#Economic_Event"/>
    <owl:inverseOf>
      <owl:ObjectProperty rdf:ID="inverse_of_outflow"/>
    </owl:inverseOf>
    <rdfs:subPropertyOf>
      <owl:ObjectProperty rdf:ID="stockflow"/>
    </rdfs:subPropertyOf>
    <rdfs:range rdf:resource="#Economic_Resource"/>
  </owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Participation">
    <owl:inverseOf>
      <owl:ObjectProperty
rdf:ID="inverse_of_Participation"/>
    </owl:inverseOf>
    <rdfs:range rdf:resource="#Economic_Event"/>
    <rdfs:domain rdf:resource="#Economic_Agent"/>
  </owl:ObjectProperty>
  <owl:ObjectProperty rdf:about="#Duality">
    <rdfs:domain rdf:resource="#Economic_Event"/>
    <rdfs:range rdf:resource="#Economic_Event"/>
    <owl:inverseOf rdf:resource="#inverse_of_Duality"/>
  </owl:ObjectProperty>
  <owl:ObjectProperty rdf:about="#inflow">
    <rdfs:domain rdf:resource="#Economic_Event"/>
    <owl:inverseOf rdf:resource="#inverse_of_inflow"/>
    <rdfs:range rdf:resource="#Economic_Resource"/>
    <rdfs:subPropertyOf rdf:resource="#stockflow"/>
  </owl:ObjectProperty>
```

After realizing all the elements in our architecture, the holistic view of our enterprise business domain ontology is formed as shown in Fig.5. (Protégé 3.4.1 is used to display the ontology):

The OWL formalization of the REA-based framework provides basis and means to the knowledge description of enterprise business process model. Then we can further expand the research, such as logic detection, knowledge discovery and maintenance.

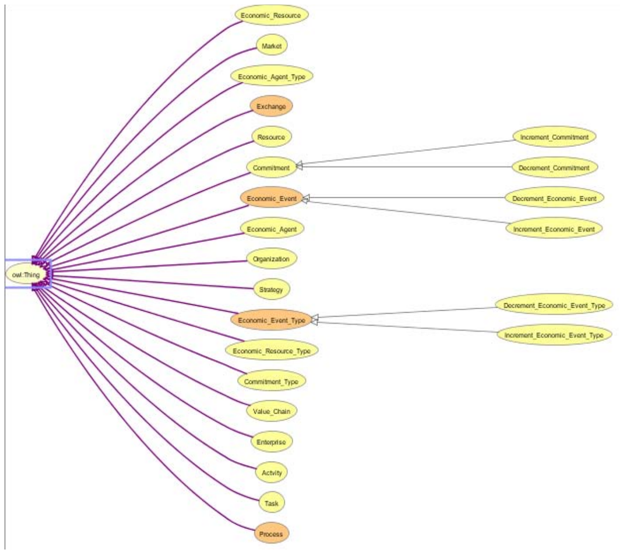

Figure 5. A holistic view of the business domain ontology

V. A STUDY CASE

To further validate and demonstrate REA-based construction of enterprise business domain ontology, we adopt a municipal Tobacco Monopoly Bureau's business to demonstrate the model's applicability and construct its business ontology.

Tobacco is a special industry which is strictly controlled and limited by the government for human health. At present, the procurement processes of Chinese Tobacco Monopoly Bureau are as follows: The National Tobacco Monopoly Bureau offers a list of cigarette brands which are allowed for each province. According to the list, the provincial Tobacco Monopoly Bureau restricts sales tasks and cigarette brands for each belonged municipal Tobacco Monopoly Bureau. The municipal Tobacco Monopoly Bureau gets order quantity ahead through interviewing retailers. According to the orders and tasks, the municipal Tobacco Monopoly Bureau develops marketing plans, and then orders cigarette online. The municipal Tobacco Monopoly Bureau will pay the suppliers online after receiving the goods.

A. Deinfine elements in strategy layer

According to our business information architecture, we first identify the elements of the strategic layer, as details shown in TABLE IV.

B. Identify business elements

After defining business concepts, we need further analysis business events, resources, participants and their relationships, related actors, characteristics and attributes. Here, we just take the purchase process for example.

Under the supervision and management of national and provincial tobacco monopoly bureau, municipal tobacco monopoly bureau will reference the volume of purchase orders and order the cigarettes directly from domestic cigarette factory. The details concepts are list in TABLE V.

TABLE V.
THE DEFINITION OF THE STRATEGY ELEMENTS

Entities	Definition
Enterprise	Tobacco Monopoly Bureau
Strategy	Follow the government's policy and supply tobacco to market
Organization	National, provincial, municipal and county-level Tobacco Monopoly Bureau
Market	Cigarette Market
Value Chain	Under the supervision and control of government and according to the retailers' orders municipal Tobacco Monopoly Bureau order cigarettes directly from domestic cigarette factories. The cigarettes will be distributed to the retailers
Resource	Cigarette and cash
Process	Interview retailer, Make sales plan, Order online, Distribute cigarette

TABLE IV.
THE DETAILREA ELEMENTS OF TOBACCO MONOPOLY BUREAU PURCHASE PROCESS

Commitment	Resource	Event	Agent
RetailerOrder	Cigarette	InterviewRetailer	Planner
SalesPlan	Cigarette	MakeSalesPlan	Planner
PurchaseOrder	Cigarette	OrderOnline	ProcurementStaff, Supplier
	Cigarette	RegisterStore	Inventory Controller
AccountPayable	Cash	Payment	Supplier, FinanceStaff

C. REA modelling

After indentify the definition of concepts, the next step is to establish the Tobacco Monopoly Bureau's REA business model and create the relationships between those concepts. The details of those relationships are shown in Fig.6.

D. Formalize the model

After the Modeling process complete, we could incorporate it into our business domain ontology, which can be done as the instance of our ontology. Take *Register Store* for example:

<Economic_Event
rdf:ID="Economic_Event_RegisterStore">
<inverse_of_Participation
rdf:resource="#Economic_Agent_Inventory_Controller"/>
<inflow
rdf:resource="#Economic_Resource_Cigarette"/>
</Economic_Event>

We can get the holistic view of ontology after all the elements and instance defined and formalized as in Fig.7.

The REA-based tobacco purchase domain ontology has been established till now. But this is not the end. The ontology must be maintained and updated in time. The mathematical basis of ontology supports the expanding

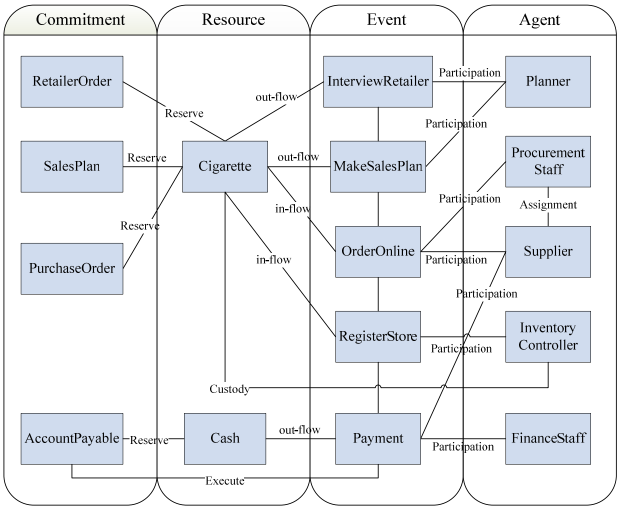

Figure 6. REA instance of Tobacco Monopoly Bureau's purchase process

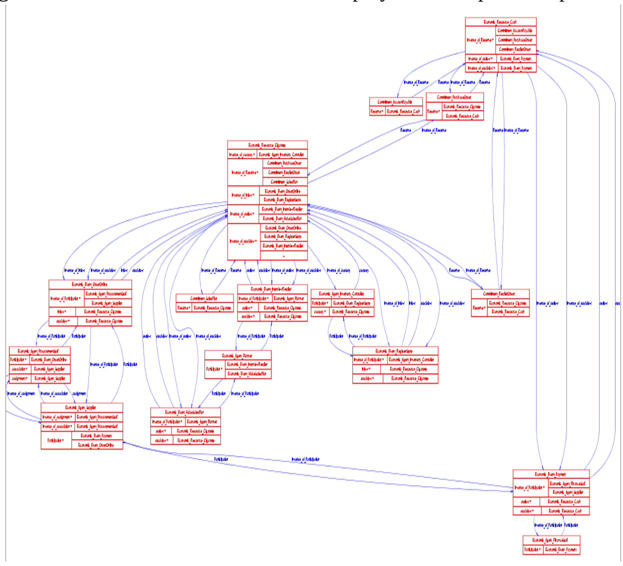

Figure 7. An example diagramof the REA ontology instance

and maintaining effectively, as well as the reasoning and knowledge finding tasks.

Through this example, we can see that REA model explicitly expresses the enterprise business model through four types of entities and the relationships between them. It's concise and easy to understand. In REA model, it's believed that the nature of business processes and events decides how to collect, store and use data. For each business event, it needs to store the following contents: event content, agent, the related issues, time and location. Therefore, it has theoretical basis and operational feasibility that we use REA framework to guide the establishment of enterprise business model, and adopt OWL as the ontology language to achieve the modeling in the field of enterprise business domain ontology.

VI. CONCLUSION

Based on the REA framework model of information systems and combined with strategic information management theory, the paper proposes a REA-based two-layer enterprise business information architecture. And then enterprise business domain ontology is established using OWL ontology descrption language.

Finally an example of cigarette trading company is used to demonstrate our method.

The proposed architecture provides a new method for business process modeling. The OWL-based ontology construction method provides means to the knowledge-based management of business processes and the realization of business domain ontology.

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