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Towards a Unified Business Model Vocabulary: A Proposition of Key Constructs

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Abstract

The design of business models is of decisive importance and as such it has been a major research theme in service and particularly electronic markets. Today, different definitions of the term and ideas of core constructs of business models exist. In this paper we present a unified vocabulary for business models that builds upon the elementary perception of three existing, yet very dissimilar ontologies for modeling the essence of a business. The resulting *unified business model vocabulary* not only condenses existing knowledge, but also tries to concatenate and (thematically) group the identified constructs into domain, enterprise, and value concepts. The resulting vocabulary helps business model designers in shaping the basic notions of their businesses.

Keywords: Business engineering, Business model, Business model vocabulary, Constructs, Ontology

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1 Introduction

Enterprises often face difficulties in translating their strategic objectives into a feasible business model [3]. Especially in highly dynamic domains, like electronic markets, practitioners encounter a great variety of pitfalls and challenges: rapidly emerging new or substitutive technologies, uncertain assumptions about the evolution of the branch the company acts in, as well as changing customer segments and needs [21], [24]. Additionally, there is frequently a severe lack of knowledge and expertise how to devise a profitable and sustainable business model [9].

Yet, what exactly is a business model? Like in many interdisciplinary research themes (i.e. in this particular case the discourse between economics, management, information systems, and computer science), the connotations and meanings of the term vary, resulting in different understandings and attributions of what it should express and what it should bring about [25], [27]. In this paper, the term *business model* is understood as formal representation of how an enterprise captures value from, creates value for, and delivers value to its actors. With this definition a special emphasis is given to both, the offering that potentially is of value to consumers as well as the enterprise developing and maintaining a valuable proposition on the market. Another important implication from this definition is that business model design cannot take place in a vacuum. A resulting business model being of use for the company and the consumers, must necessarily reflect the singularities of the domain (e.g. [14], [22], [29]).

The objective of this paper is simple, yet complicated due to the great variety of perceptions and research foci: we want to provide a common language, or at least as a first step identify the most important constructs, for designing value-oriented, enterprise-centric, and domain-specific business models. In this sense, the major contribution of this article is a vocabulary, consisting of a set of constructs and its corresponding relations that may assist practitioners in the task of innovating and designing their business model(s). The purpose of such a vocabulary for business models is twofold:

1. Up to now, business model designers have to choose a specialized ontology for modeling a specific part of their business. Existing ontologies are not compatible (e.g., in terms of granularity, scope, terminology) and to a certain extent even redundant. A later switch to another ontology is often not possible or only with a lot of effort. Starting the modeling with a general approach helps to improve compatibility of used concepts and increases flexibility for later changes. However, this implies a trade-off between generality and specificity. As a consequence, we pay the price of loosing valuable insights about the inherent logic of an enterprise's value creation (e.g. hidden rules of specific domains).

2. A general ontology is needed in order to simplify the exchange of models and allow for distributed modeling. The indication about a needed discussion with respect to the different ontological approaches and formalizations of the existing ontologies is appreciated. However, it is difficult to do so, since not much information on that account is available. In this sense, a first proposition of a general vocabulary could be the trigger for more formal business model ontologies.

Admittedly, we are not the first in thinking of a terminological underpinning for the business model context (e.g. [2]). However, this paper is different in a way that it provides an overall, general-purpose vocabulary for business or systems analysts (not necessarily IT-specialists) that can be used for both, completely or partially for formalizing business models. The focus is not exclusively on value, enterprise or domain modeling. It tries to bridge different aspects of a business model. Furthermore, the vocabulary is not dependent on or bound to any implementation or notation-specific restrictions. The proposed *unified business model ontology* is nevertheless not a fully decoupled research result. It is grounded on common practice, respectively it is the product of the merging of three well-known and widely used business model ontologies.

2 Existing Ontologies for Business Models

Likewise to the varying understanding of what researchers and practitioners comprehend as *business model*, there is also a non-uniform use of the term ontology. In information systems and computer science it is frequently referred to as “an engineering artifact, constituted by a specific vocabulary used to describe a certain reality, plus a set of explicit assumptions regarding the intended meaning of the vocabulary words” [8]. It is also understood as “a formal, explicit specification of a shared conceptualization” [7]. Adopting this definition of ontology implies two important premises: (a) the ontology is specified in form (syntax) and content (semantics), and (b) the ontology is appropriate to represent a consolidated world-view of a delimited domain (pragmatics). Ontologies typically follow the principles of abstraction (i.e. simplify complexity by formulating general concepts), reuse (i.e. building on the existing knowledge base), and evolution (i.e. iterative development from simple to more complex vocabularies) [12]. Examining the knowledge base in the context of business models, several artifacts can be found that are consistent with the above-mentioned comprehension of ontology.

Following Malone and Crowston [13], business knowledge, such as ontologies, generally can be organized in a 2x2 matrix (see Figure 1). It is possible to distinguish generalized or specialized knowledge: while the former aims at

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providing universal constructs for any field of application, the latter intentionally constricts scope in order to render specialized support. Another differentiation between aggregated and decomposed knowledge is possible: whereas aggregated knowledge focuses on the macro-level, decomposed knowledge rather emphasises the very bits and pieces on the micro-level.

With respect to business ontologies we found aggregated vocabularies delineating a business model of specialized branch [15], [19] or technology [20] (upper right corner), or rather general ontologies looking at the very details of how to describe a particular aspect of a business model such as value creation [1], [5] or enterprise transformation [11] (lower left corner). The great part is yet on concrete business models [4], [23], [26], sometimes with, sometimes without ontological underpinning (lower right corner).

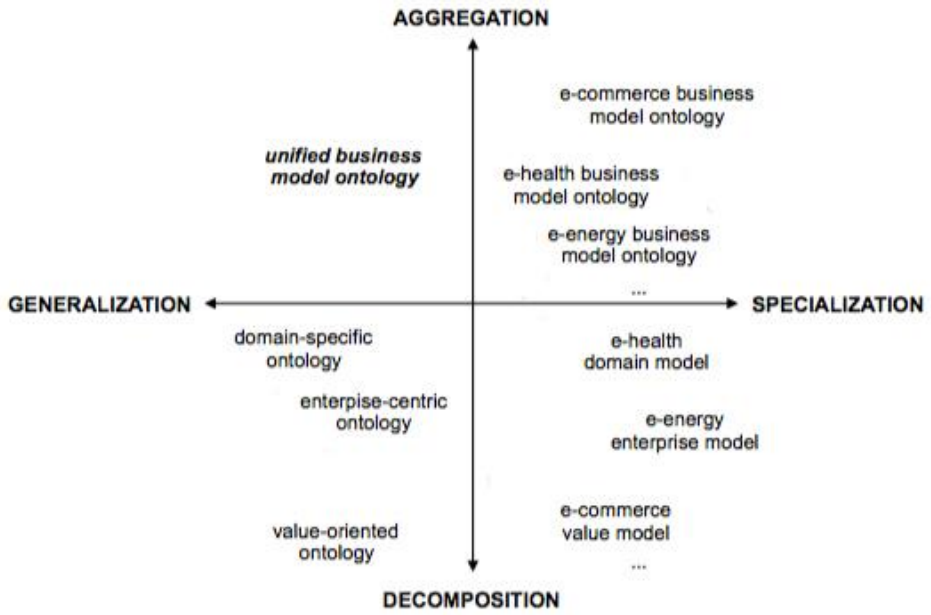


Figure 1: Positioning of different approaches

As mentioned above, it is our goal to provide a general-purpose ontology, or at least a basic vocabulary for business models (upper left corner). We want to aggregate domain-specific, enterprise-centric, and value-oriented vocabularies to a unified ontology that contains all the fundamental constructs which enables modelers to specify holistic blueprints of their businesses. However, as with any design-oriented study, there is no single right way to conceptualize such a vocabulary nor a single right final solution ("artifacts are only more or less useful for human purposes" [10]).

Since utility is the most important quality criterion in design-oriented research, we substantiate our selection of basis ontologies on this premise. We found that the unified business model vocabulary will be utile when it covers the most essential aspects of business models and when it enables multi-perspective modeling of business models. The selection of base ontologies for developing the unified vocabulary is based on the following rationale:

1. The selected base ontology must be general in nature (i.e. not designed for a specialized application area).

2. The base ontology must be well-known and widely applied by enterprises to ease transfer to practice.

3. The overall selection must be balanced and facilitate the modeling of all relevant aspects of a business models.

In examining the relevant literature, we found three generic ontologies that address distinct aspects of business models. All three ontologies are instantiated (to a certain extent) by means of software; this made us assume a certain level of proliferation in comparison to ontologies without instantiation. The following sub-sections describe in more detail the constructs of the selected base ontologies.

2.1 e^3-Value Ontology

A lightweight, yet very useful and widespread vocabulary for modeling value-oriented business models, the "e^3-value ontology" [6] features several extensions as well as a particular toolset (Site 5). The basic constructs in e^3-value are

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actors, value objects, value ports, value offerings, value interfaces, value exchanges, value activities, and market segments [5] (see Table 1).

Table 1: Definition of constructs used in e^3-value

Construct	Definition
Actor	Independent economic entity with the ability to making profit (e.g. company) or increasing utility (e.g. end-consumer).
Value object	Object that is of value for one or more actors (e.g. services, goods, money).
Value port	Tracer indicating that an actor wants to offer or request a value object from its environment.
Value offering	Set of equally directed value ports indicating what an actor offers or requests from its environment.
Value interface	In its simplest form, a value interface consists of one offering. A complex value interface groups one ingoing and one outgoing value offering.
Value exchange	Connection between two value ports.
Value activity	Collection of operational activities yielding a profit or utility increase assigned to a specific actor.
Market segment	Set of actors sharing from an economic perspective one or more of their value interfaces and value objects.

Contrary to process models, which show how to operationalize tasks and activities, it is the major emphasis of e^3-value to illustrate what economic value is exchanged and by whom. The perception of a business model is restricted to the determination of value exchange (and partially also to value creation). Domain and enterprise-related considerations play only a minor role.

2.2 Business Engineering Core-Business-Metamodel

The *Core-Business-Metamodel (CBM)* is a less value-oriented, but rather enterprise-centric approach for depicting the essence of a business [16]. In the tradition of business engineering (BE), the main emphasis of this approach is to provide the fundamental constructs for models and methods enabling a systematic transformation of an enterprise. BE also tries to extend existing limitations of highly specialized approaches by providing various perspectives (both intra-organizational, and inter-organizational) for analyzing, (re-)designing and implementing structural changes in the business model of organizations. Similar to the previous ontology, distinct extensions of the original vocabulary as well as tool-supported modeling exist (Site 2). The most relevant constructs from this rather broad ontology are defined in the subsequent table (see Table 2).

Table 2: Definition of constructs used in CBM

Construct	Definition
Market	Economic environment where actors interact with each other in order to making profit or increasing utility. Market typically consists of distinct market segments.
Organization	Systematically structured and managed entity to pursue collective goals on a continuing basis.
Organizational unit	Collection of employees grouped by business roles to perform certain tasks for the organization.
Consumer	Actor wanting to increase its utility function by purchasing a service.
Producer	Actor wanting to maximize profit by offering a service.
Intermediary	Actor mediating between consumers and producers in order to maximize profit or increasing utility.
Business role	Set of rights and duties needed for the fulfillment of a task.
Business goal	Targeted outcome with the accomplishment of a business process.
Business process	Set of partially ordered and coordinated tasks to fulfill a specific business goal.
Task	Logically structured assignment to be performed by a business role.
Activity	Atomic elements of a task.
Information	Processed data needed for the fulfillment of an activity.
Infrastructure	Set of carbon (i.e. employee) and silicon (i.e. hardware and software) resources to support the processing of activities.
Service	Resulting output or needed input for the conduct of a business process.

CBM offers an extensive collection of constructs for delineating enterprise-centric business models. However, major weaknesses can be found in the lack of emphasis on the value proposition and in its complexity due to its high expressive power. Furthermore, no consistent graphical visualization of different model types exists.

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2.3 Osterwalder's Business Model Ontology

The Business Model Ontology (BMO*) is* probably one of the best known vocabularies or *frameworks* in the context business models is*.* It was originally proposed by Osterwalder and Pigneur [18]. Although taking the perspective of a single enterprise, the BMO highlights the needs and demands of customers and the domain it acts in. In practice it has been popular because of its simplicity and tangibility, resulting in relatively appealing and user-friendly tools for delineating business models (e.g. Site 1).

In its simplest form, a business model can be described by nine main constructs [17]: value proposition, value configuration, target customer, distribution channel, relationship mechanism, capability, partnership, cost structure, and revenue stream (cf. Table 3).

Table 3: Definition of constructs used in BMO

Construct	Definition
Value proposition	Overall view of an organization's bundle of value objects for a particular actor.
Value configuration	Arrangement of activities and resources that are necessary to create value for the targeted customer.
(Target) Customer	Intended consumer and market segment an organization wants to pursue its value exchange.
Distribution channel	Link between the organization and the target customer through which value is exchanged.
Relationship mechanism	Collection of activities needed to link the organization between itself and the targeted customer.
Capability	Ability to perform a repeatable set of activities or tasks that are necessary to create value for the targeted customer.
Partnership	Voluntarily initiated cooperative agreement between the organization and a producer or intermediary in order to create value for the targeted customer.
Cost structure	Representation in terms of cash of all the means employed to run and maintain the business model.
Revenue stream	Collection of activities needed for generating cash flows for the organization.

The major advantage of the BMO is the balanced structure of concepts, including value-oriented, enterprise-centric, and domain-specific constructs. This allows practitioners to outline quite a wide range of considerations as to current or future business models. However, this broadness often gives rise to relatively superficial business models, since a lot of internal value-creating mechanisms and structures are faded out. No common language elements are provided to specify them in a systematic manner. Like CBM, no standardized graphical representation exists.

3 Proposition of a Unified Business Model Vocabulary

As described in the preceding section, it is the aim of this article to build an aggregated and generalized vocabulary (see Figure 1; upper left corner) by means of merging the three previously described ontologies. The act of conflating the e^3-value ontology, CBM, and BMO to a unified, general-purpose vocabulary entails some difficulties since the terms and relations of the mentioned ontologies are not formalized; accordingly, the application of an automatic or semi-automatic merging approach is not possible. In a first step, we manually checked for similarity of concepts, made explicit assumptions regarding the intended meaning of the terms, and formulated some purposeful relations for linking the distinct vocabularies to a common and integral set of terms. We followed a shortened grounded theory approach with two coders. While the main emphasis of a regular grounded theory process is to discover concepts, categories, and the relationships between them [28], our focus was just on allocating concepts to the previously defined business model views (domain view, enterprise view, value view). Although this clustering is not necessarily needed for merging the three ontologies, it simplifies the further specification of relations between the terms. The grouping also improves the lucidity of the overall ontology, making it much easier for practitioners to use it.

In a second step, the terms and relations between the terms were modeled with an ontology editor. We used the ontology editing tool Protégé (Site 3) and Web Ontology Language (OWL) as means for specifying all the identified constructs and partially also to define the already existing relations between the terms. We defined new relations based on the previous thematic clustering of terms. Identified redundancies were deliberately not removed, as we wanted to give business model designers the freedom to choose the constructs which make more sense to them. We imported the newly developed ontology in a toolset named Visual Understanding Environment (Site 4) for creating an overall graphical representation as illustrated in Figure 2 for communication and training purposes with practitioners.

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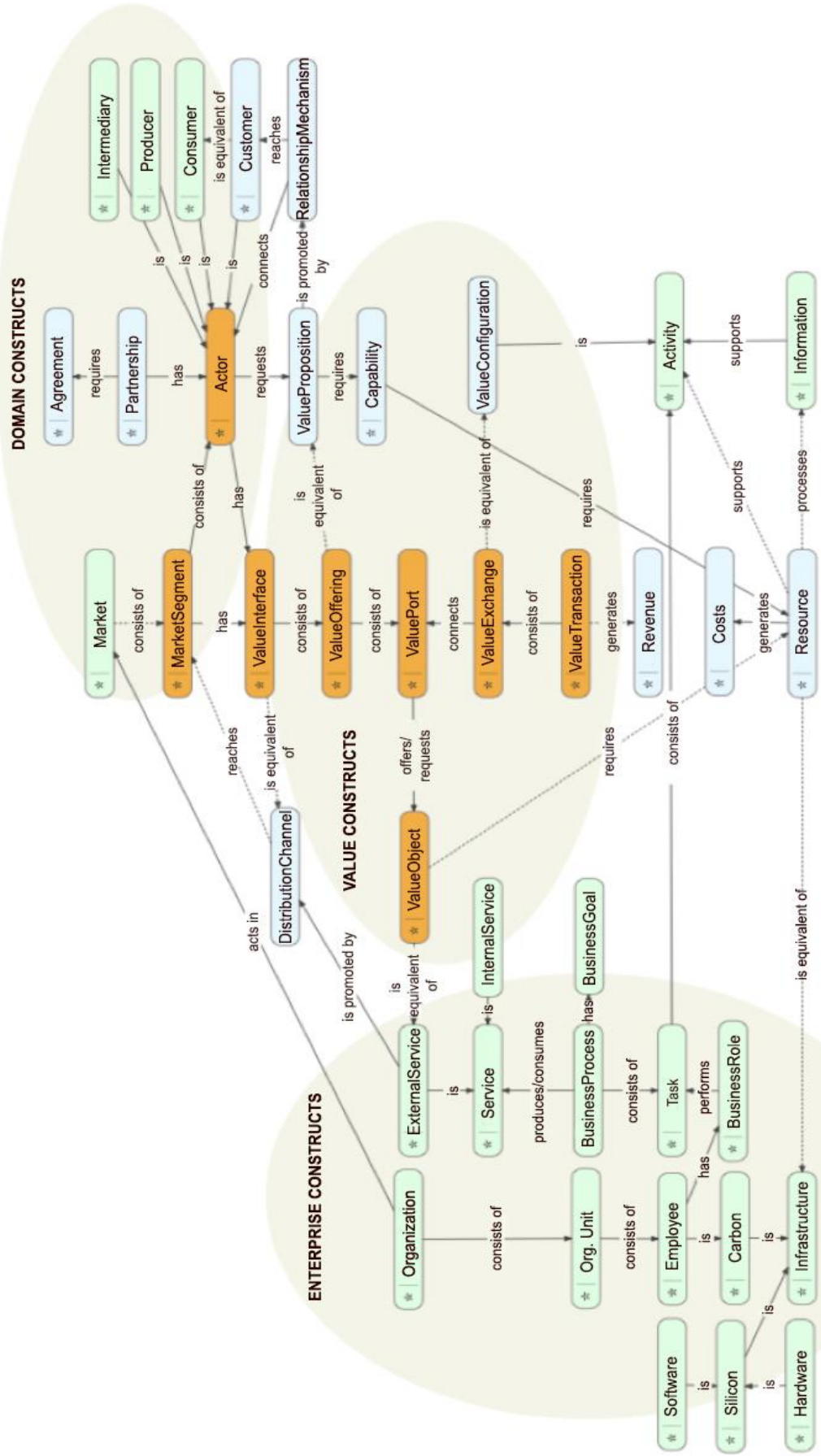


Figure 2: Unified business model vocabulary

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4 Discussion and Conclusion

Notwithstanding the considerable scientific attention and practical relevancy of business models, there has been little agreement about its substance and scope. Consequently, a commonly agreed definition of the term and its ontological constructs is still missing. Based on three distinct, yet complementary, vocabularies, we proposed a unified business model vocabulary. In doing so, we contributed to this thread of research by integrating different views on and concepts of business models to a common, integral set of constructs and relations.

Hitherto a business model designer has to choose from an existing, often very specific ontology to model a very specific part of the business model. There are no interconnections between the models. If a business model designer wants to model another aspect, he/she often must model similar facets again which increases redundancy of the overall model base. Therefore, a unified vocabulary increases flexibility: one can start with describing a particular dimension of the business model and switch to another without the need to change the toolset, terminology and mindset. The expressing power of the unified is not necessarily superior, but certainly it is a more effective and flexible approach than using different ontologies for modeling different aspects of an overall business model.

The presented *unified business model vocabulary* is a first attempt in providing business and systems analysts with an expressive set of constructs for outlining domain-, enterprise-, and value-specific aspects of their company's business model(s). It could also be utilized by scientists as a reference for further endeavors to harmonize the fragmented knowledge base on business models.

In light of the findings presented in this paper, there is yet much potential for improvements and for future research:

1. Merging other viewpoint-specific ontologies: The proposed unified business model ontology is the result of the merging of three existing, widely applied ontologies. There is neither a single right way to develop a design artifact neither to expedite a shared understanding of a certain part of reality. A merging of other ontologies might complement the proposed vocabulary with additional terms that possibly are of interest to a specific group of modelers.

2. Fully formalizing concepts and relations: The majority of identified ontologies are centered around the identification of the core of business models. The resulting vocabularies typically just define the basic terms. With the formalization of relations and axioms, new possibilities in terms of automated reasoning might considerably improve inconsistency and vagueness in the developed models (e.g. by eliminating or matching semantically duplicated terms).

3. Providing tool support: Ontologies, especially complex ones, are only habitually used by practitioners when they are integrated into workflows. Therefore, the pure formalization is not enough. The vocabulary needs to be integrated in methods and software instantiations for modeling, executing, maintaining, and controlling the performance of the operationalized business model(s).

4. Experimenting with graphical representations: Visualizing an outlined business model is an essential activity for communicating the results to a broader group of people within the company and across its borders. Up to now major parts of business model ontologies apply visual representations that originate from software engineering such as entity-relationship-diagrams or UML-diagrams. Since the audience of business model representations is less technical, it might be an important further development to identify suitable graphical representations of business models.

5. Providing assistance in the instantiation of the business model: Although generalized vocabularies offer some aid to specifying a business model, it is still very complex for practitioners to actually instantiate and operationalize a business model. As for now, only rudimentary assistance exists that alleviates business and systems analysts in pursuing this final step (e.g., by providing exemplary cases or very specialized and detailed terms). Still, more support is needed to encourage practitioners to systematically make use of business model ontologies and tools.

The next steps in our own research will include the full formalization of the merged constructs as well as the integration of the ontology in a newly developed methodology for building block-based modeling of business logics. We will also put further emphasis on the evaluation of the expressiveness of the artifact by testing the ontology in a real environment. It is hoped that this unified business model ontology becomes a reference and enables consensus in the community.

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Websites List

Site 1: Business Model Foundry, Business Model Generation
http://www.businessmodelgeneration.com/toolbox

Site 2: Adoben, University of St. Gallen
http://adoben.iwi.unisg.ch/

Site 3: Protégé, Stanford University
http://protege.stanford.edu/.

Site 4: Vue, Tufts University
http://vue.tufts.edu/

Site 5: The e^{3}value toolset,Vrije Universiteit Amsterdam
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