Business Models for Semantic Content Providers

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Abstract. The Semantic Web, being the next phase in the evolution of the Web, relies on the existence of semantic annotations i.e., the documents describing the data and information using ontologies. The major barrier in the development of the Semantic Internet is that the process of creating semantic annotations is complex and labour-intensive. The lack of semantically annotated data on the one hand, and the need to create, disseminate and use standards for data description in the Semantic Web on the other, have created a niche on the market for suppliers of the semantic content. The purpose of this paper is to present business models of the semantic content providers and discuss the benefits and challenges in the delivery of semantically annotated artefacts.

Keywords: Semantic Internet, content providers, business models.

1 Introduction

A business model is a conceptualization of the logic standing behind providing value by a company. Whenever we observe a shift in the economy paradigm and emergence of new technologies, a discussion on the applicability of the already defined business models appears. A good example may be the emergence of the Internet and new business models that needed to be defined in order to take advantage of new possibilities and to address new challenges [1–4]. The impact of ICT development on business may be summarized as follows [5]:

- more and more networking organizations as affordable and easy to get ICT technologies have reduced transaction and coordination costs, i.e., costs of collaboration and costs of providing customized products and services,
- possibility to offer completely new and innovative products and services relying on various information components or new technologies, very often provided by multiple companies collaborating to achieve a common goal,
- possibility to reach customers in new and innovative ways and through a multitude of channels,
- possibility to conduct business on a global scale,
- emergence of new pricing and revenue mechanisms.

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Progress and achievements in the ICT field as well as increased highly the number of possible business configurations, caused choices made by managers to be even more difficult and complex. Therefore, with the new paradigms and trends in ICT, such as e.g., the appearance of the Semantic Web, new business models adjusting the existing concepts to the new settings are needed.

The Semantic Web, being a major step in the evolution of the Web [6], aims at making the content of the Web not only machine processable, but also *understandable* by using semantic annotations. A semantic annotation is machine *understandable*, if it is explicit, formal, and unambiguous [7] (i.e., publicly accessible, agreeable and identifiable) and this goal is usually reached by using ontologies [8]. However, the process of creating the semantically annotated content still constitutes a challenge and requires an involvement of a human with a degree of knowledge about ontologies. In addition to the problem of incentivizing users to create semantic content, there is still a lack of convincing semantic applications for users and companies as well as a lack of semantic content (and semantic content providers) that could be used by the applications.

In order to facilitate the adoption of the semantic technologies, the semantic community must present advantages of using proposed approaches in the business context and provide convincing business models for business partners. Thus, the main goal of this paper is to provide arguments in a discussion on the possible business models that could support the semantic content creation process. Within this paper, we propose a business model design template that can guide organizations while making decisions regarding the usage or creation of semantically annotated content. The discussed issues are to point out to all interested players the potential and expected benefits of application of semantic content and thus, facilitate their adoption. The work conducted was driven by the design science paradigm postulated in [9].

In order to realize the above discussed goal, the paper is structured as follows. First, the specific aspects connected with the semantic content providers, their classification are presented. Then, the general concept of a business model is discussed together with the challenges related to its definition process as well as the analysis of the operations model (what?), actors involved (who?) as well as possible value creation opportunities for the content providers (why?). Next, the developed business model design template is presented and discussed. Finally, the paper concludes with summarising remarks.

2 Semantic Content Providers

In the Internet – a Web of Data [10] – we assume existence of two target groups:

- content providers (information providers), who publish data and meta-data on the Web,
- content consumers, who first decide whether or not to accept the data offered (quality and trust related issues)[11] and then consume it.

Having a look at the semantic data providers, we may further divide them into:

- not-fully fledged semantic data providers or owners – providers or owners of data sources with well defined, unambiguous structure, however, not provided in a RDF[1] format;
- fully-fledged semantic data providers – providing any kind of data in a machine-readable format through deferenceable URIs (Uniform Resource Identifiers), SPARQL endpoints or RDF dumps (this category encompasses also linked data providers, so e.g., DBpedia);
- semantic data application providers (i.e., service providers) – in this case semantic data is processed/consumed by some application and a human or machine readable output is created. This category encompasses also the providers of semantic services.

These categories may be flexibly assigned to a data provider, all at the same time. The role that a provider is assuming, influences the business model followed.

There exist quite a few data providers on the market. In addition, to the classification presented above, they may also be divided into Web 1.0 content providers and Linked Data [10] providers. According to the scope of knowledge data they offer represents, we may distinguish providers of domain specific and general resources. Table 1 presents a few examples of semantic data providers and maps them into the distinguished categories.

Table 1. Semantic Data Providers - examples

Type / Scope of knowledge	**General Resources**	**Domain specific resources**
Not-fully fledged semantic data providers	Wikipedia	various topic specific databases
Semantic data providers	Freebase, DBpedia Cyc/OpenCyc, Yago or Wordnet	GeoNames and other domain specific elements of Linked Data cloud

To summarize, semantic content production may be related to two different areas of company activities: where information is a product offered by a company or the information concerns the main product of the company and is a way of promoting this product. Within next section we focus on the business models and current achievements in this area as well as specific aspects of business models in case of content providers.

3 Business Models of (Semantic) Content Providers - Concept and Challenges

A business model, being a conceptualization of the logic standing behind providing value by a company, specifies the following features [4, 12, 13]: major flows

[1] RDF - Resource Description Framework.

of product, information, and money; major benefits to participants; roles and relationships among organization's consumer, customers, allies and suppliers.

A business model does not focus on processes, but instead on the value exchange and the value creation among actors. However, similarly to the business process model, a business model, being a simplification of the complex reality [14], also provides an understanding of the current business or helps to plan how a business should look like. However, the business model defines, how company makes money (or value in general) by specifying where it is positioned in the value chain [4].

In the context of content providers, regarding the **Who pays?** question – there are three categories of actors that may provide payments, namely:

- content consumers – being the main stream of revenue, providing payments at the time of consumption; however, other mechanisms can also be applied relying on deferred and indirect reciprocity, following [15] they encompass loans and subscription fees (deferred reciprocation); gratis access for limited time or functionality, but after some time for a specific fee (conditional deferred reciprocation) and debt factoring (indirect reciprocation);
- content providers – being obliged by a mission statement (e.g., government agencies and Linked Open Data paradigm) or by legal obligation (e.g., companies and their financial statements);
- third parties – here the most common examples are:
  - advertising and sponsoring – advertisers and sponsors perceive enough benefit in exposure, brand building or referrals of customers to pay for the goods or services [15];
  - patronage – benefits for the payer are psychological in nature – as in case of Wikipedia or DBpedia;
  - subsiding encompassing transfer payments, e.g., within or between organizations.

For what? – we pay for:

- content and services – also their specific features such as accuracy and precision or timeliness;
- value-add – updates of information/content, customization, as well as adding some expertise to the content, proving to be more beneficial for the consumer; this includes also so called differentiated products [15];
- complementary goods and services – e.g., training, advice on application as well as activities required by the consumers to sustain a prior investment.

Thus, as the creation, publishing and maintaining content (and it is even more challenging in case of semantic content), takes time and a lot of effort, the following table summarizes the economic incentives – i.e., the direct or indirect revenue model, the companies may have in order to become a semantic content provider (see table 2). Please note, that the semantic content may be delivered in two ways as raw data or as an application.

Table 2. Direct and indirect revenue models

Model	Revenue Type	Comment
Subscription	Direct	Paying for the access to the content or services (semantic content driven applications). Although, usually the basic access to the semantic data is usually for free, one may pay for[2]: **full access** - access to richer, more detailed data; **timely access** – paying for an access to the most recent or current version; **archival access** - paying for having more data to analyse and explore; **unlimited access** - paying for access within the specific time frame, frequency of accesses or number of concurrent ones; **convenient access** - paying for access to the data through a specific mechanism. Some of these models are directly connected to the value-added based revenue model.
Value-Added	Direct	Semantic data enhanced applications, additional aggregation, personalization
Advertising and affiliate links	Direct and Indirect	Sell advertising around the data-driven applications and services providing access to data as well as e-commerce affiliated links embedded in the presented data
Branding and positioning	Indirect	Using semantic data and ontologies to shape the market and build the position
Sponsorship	Direct	A semantic data provider may be funded to do so.

Why? – this deals with the motivation the person paying has and it may encompass the following:

- perceived value – encompassing such categories as: quality, uniqueness, lowest available price, speed of gaining an access to the product or service,
- other such as necessity, fear (e.g., against court-actions), conscience (e.g., shareware approach) or duty and fairness (e.g., buying a legal copy of content I have already tried and like).

Much research has been devoted to the attempt to define the elements that a business model consists of by distinguishing building blocks and relations between them e.g., [14, 16–18]. However, up till today, among researchers and practitioners there is still no agreement regarding neither the scope nor definition of the elements that should be taken into account while describing the business model followed by a company. One of the most interesting conceptualizations of business model's components is, in our opinion, the one offered

[2] `http://www.ldodds.com/blog/2010/01/thoughts-on-linked-data-business-models/`

by Osterwalder [5], who provides a synthesis of different approaches and suggests a single reference model. Osterwalder distinguishes four building blocks: Infrastructure, Offering, Customers and Finances. The structure proposed by Osterwalder is in fact a business model design template, which allows enterprises to describe their business model. However, if we would like to apply this business model design template to the Semantic Web world, we would fail, as it needs first to be adjusted to the specific needs of semantic content life-cycle management processes in order to become a useful tool also in this area. In case of semantic technologies, elements of a business model should get a semantic flavour including elements specific for the Semantic Technologies domain. This concerns not only different offering (object type) or the offering channel, but also the introduction of the non-monetary aspects regarding the reputation or role played within the community. The traditional economic approach to definition of business models is no longer the case [19]. The main issue is related to information features, and between them information scarcity that undermines the typical model. The new values that appear besides the traditional revenue and profit are, i.e., reputation, business relationships, social responsibility, environment footprint. And finally, what also greatly influences the business models of companies is the massive customization. This means that not only the products should be personalized based on individual preferences but also technology that facilitates this personalization will be human-centric.

Within the next section we focus on the developed business model design template and its validation.

4 Business Model for Semantic Content Providers

The business model described within this article was developed taking into account the previous research in this field. Therefore, firstly an extensive state of the art review has been performed. Then, the business model dimensions together with sub-dimensions were defined. This definition allowed for further instantiation of the business model developed. The business model created was validated based on various case studies. This enabled for further extension of the business model and delivery of the result presented in the article.

4.1 Business Model Overview

The business model for the semantic data and service provider enables defining how an organization may create its business value in the Semantic Web domain. This enables for definition of a value object (product or service) and the way of earning money (or gaining non-monetary benefits) by providing or selling this value object.

The dimensions of the business models that were adopted to describe the business model are as follows:

– **offering** – related to the selling object and the offering distribution channel,

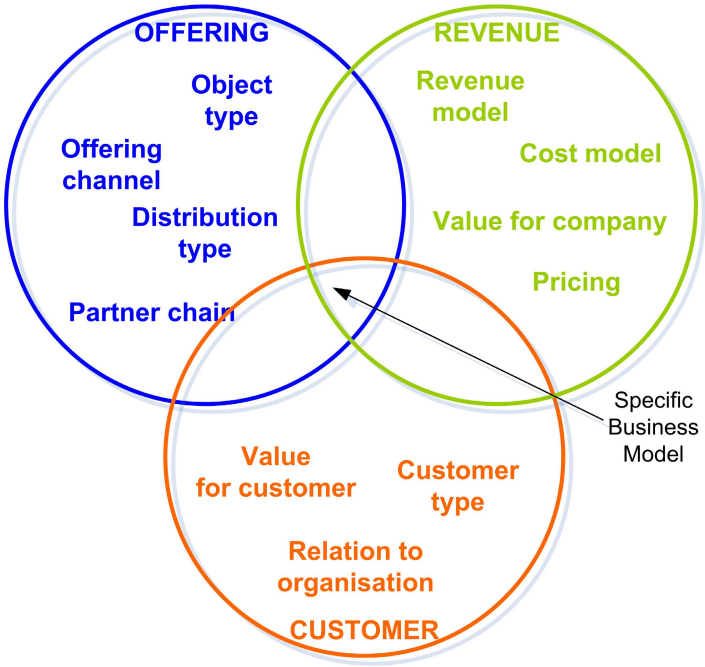

Fig. 1. Business Model Overview

- **revenue** – defining the monetary and non-monetary aspects,
- **customer** – showing the customer perspective on the business model including the value perceived or relation to the offering organisation.

Worth to notice is that besides of classical elements that have to be addressed within the business model related to the partner network, costs and revenues, the business model for semantic data and services should also take into account the intangible issues. The Semantic Web technologies are still in their early maturity phase, therefore, the companies besides gaining the real income, build their reputation in the field thus, increasing their value as perceived by the community. For this reason, the business model proposed incorporates also the appropriate "non monetary" sub-dimension.

The following sections present the proposed dimensions and the sub-dimensions and discuss their potential values.

4.2 Offering

This business model dimension describes a product or service that creates the value for a customer (an object). Therefore, the object as well as the channel through which the object is offered to the customer must be described.

To provide a sufficient level of details, the following sub-dimensions were identified:

- **Object Type:** Description of an object being offered to the customer. The object is of value to the customer. In the semantic data and service domain, the following object types were identified: conceptualization, knowledge base, querying engine, integration of data from diverse sources, semantic application, supporting tools (for developers) and consulting. These object types may be standardised or customised taking into account different requirements that may appear.
- **Offering Channel:** The offering channel describes the way the customer may access the offering. In case of semantic data or services, that is an intangible product, the offering channels identified are: querying interface, website, documentation, online/traditional consulting, data dumps and application. The offering channel is closely related to the object type, as each new object demands definition of a new offering channel. Moreover, not all channels are applicable in all cases, e.g., consulting may not be offered through the querying interface.
- **Distribution Type:** Describes the way the customer is addressed by the company. The contact of the customer with an offering organisation may encompass the following forms: cooperation, alliance or buyer/seller agreement model. The alliance, similarly to cooperation is set to *"advance the common goals and to secure common interests"*[3], however, it may be more formal than traditional cooperation, having one party managing the cooperation. The organisation may be also a part of the value-added chain. In this case, the organisation either is a seller of the solution delivered by the whole value chain or a contributor to a solution offered by another party, e.g., by offering data or services.
- **Partner Chain:** Describes the method the offering is provided to the customers. The organisation may distribute its offering directly or indirectly to customers. The direct partner chain means that customers contact and collaborate with the organisation itself; third-party collaboration means making the product available via the third party. The last sub-dimension of the partner chain is the cross-sales, meaning selling the data or services in a data or service bundle or simply together with an another product.

4.3 Revenue

This dimension of the business model depicts how an organization gains value (in monetary and non-monetary terms) while delivering its data or services to clients. The revenue may be generated directly based on income from a customer or indirectly from another stakeholder that prices the offering. This dimension is to describe the revenue, the cost model and the pricing method.

[3] `http://en.wikipedia.org/wiki/Alliance`

The following sub-dimensions were differentiated:

- **Revenue model** that describes the method the customer uses while paying for the offering. The revenue may be created by selling or licensing the offering object. Some organizations, provide its offering for free on the community-access basis, what is also included in our business model. Some other revenue models cover subscription, usage fee, licensing, advertisements, donation-based or asset sale, being the traditional revenue models in the ICT.
- The **pricing** describes the way the price for the value object is determined. The price may be fixed (stable, however there might be certain price groups differentiated) or dynamic (depending on some features of the offering). The fixed pricing model describes also the situation, when the content or services are offered for free. The price may be set directly (in most cases) or indirectly (depending on some additional features, what may be the case, e.g., in cross-sales).
- The **cost model** explains the way the expenses are accounted in the organisation. Besides of the accounting method used, this sub-dimension focuses on explaining the management of costs incurred while delivering the offering. In traditional approaches, the cost model is cost-driven. In case of intangible objects or when the offering is hard to account its value, the value-driven cost model should be applied.
- **Value for company** (non-monetary value) that describes the value the company has as perceived by the community. This value does not emerge from the accounting procedures, i.e., difference between the income and the costs. This value is related to company reputation, social responsibility, branding and corporate image and role played within the community. This sub-dimension explains, e.g., the DBpedia model, where the financial flows enable for functioning with necessary investments only, building however a brand that makes DBpedia more valuable than the total assets it possesses.

4.4 Customer

The customer is the third dimension of the business model and the object for which the offering is of value. The offering to be valuable, must be aligned to the customer's requirements. This dimension encompasses:

- **Value for Customer:** This sub-dimension defines the real benefit for a customer from buying or using the offering object. The following features were differentiated: cost decrease, quality increase, access to knowledge, pleasure, robustness, interoperability, time reduction and increase in quality. These features are twofold, as the access to knowledge granted by using the semantic data or services is an enabler of all other values listed (except from pleasure). Moreover, access to knowledge may be also understood in terms of the education possibilities. Finally, sometimes the users will benefit from semantic application without noticing that they are semantically powered.

- **Customer Type:** This sub-dimension defined the types of customers potentially interested in the offering.
- **Relation to the Organisation** describes, how an organization interacts with its customer and how the customer is being offered with the value object. Initially, the following relation models were distinguished: community, agents, business partner, individual user and contributor.

In order to verify, whether the developed business model design template is aligned with the assumptions and usable for business entities, it was validated on examples of various organizations delivering semantic data and services. Due to the limited space, the validation results are not presented in this paper, but may be found in [20].

5 Conclusions

This article discusses the issue of business models for the semantic content creation. The notion of a business model relates to the Porter's concept of value chain investigating the issue of value creation at a company level. The value chain is to define elements of the business that contribute to the life-cycle of a product delivering value to a customer. A business model goes one step further, focusing not only on issues such as supply, demand, margin or revenue, but also presenting the relations of the company with its environment and trying to identify value of these relations.

The Internet and its popularity contributed greatly to definition of new business models, that also influenced the business models in the traditional world. The Semantic Web will cause another change. Introduction of Semantics may bring a desired level of automation, and change the way people work with different applications. However, to fulfill this vision, we firstly need to deal with challenges regarding semantic content delivery and application. And here the human involvement seems to be inevitable. Therefore, the current business models for the Future Internet in the area of the semantic content creation have to take into account the user involvement.

Semantic content providers, as all enterprises, need to identify customers or customer-segments, recognize their needs, then to structure offers that satisfy those needs and deliver perceived value over the free-sources by differentiating products. The differentiation in case of the content may be performed in various ways (e.g., bundling with products from strategic partners, improved search-facilities). The semantic content production may be related to two different areas of company activities: where information is a product offered by a company or the information concerns the main product of the company and is a way of promoting this product. This greatly influences the definition of the business model.

This article is one of the inputs to research work on business models for the Future Internet, presenting the Semantic Data and Services point of view in the discussion. This work however, is still an ongoing effort and the research team

involved will advance certain elements of the business model providing insights into the business model for the Future Internet.

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