The Semantic Web has left the status of pure academic research topic and has become a framework for practice web applications and a new kind of commercial approach called “Semantic-Web-based E-Commerce”. While a lot of concepts as well as practical applications for the lower layers (Fig. 1) of the Semantic Web exist and layers like “Logic” and “Proof” are not necessary in a lot of e-commerce use-cases, the top-layered “Trust” concept has still been far away from implementations during the last years.

The Austrian Federal Economic Chamber (Österreichische Wirtschaftskammer, WKÖ, www.wko.at) is currently working on an interesting approach for data validation within the Semantic Web using their “Firmen A-Z” (FAZ), a company register system that includes basic data of more than 400,000 Austrian companies¹.

¹ See http://firmena-z.wko.at for more details.
Within this approach a link to define trustful Semantic-Web-data of a company is integrated. Similar projects for private usage map this approach to the area of social networking platforms like Facebook\(^2\). The basic idea is to provide an easy method for web users to indicate data within the web as trustful, so that intelligent web applications can work with this information without any further trust proof mechanisms like digital signatures.

**Semantic-Web-based E-Commerce**

E-Commerce applications are getting more and more popular, the online market is one of the most growing ones these days, 2011 the volume of e-commerce trading will be three times the volume of 2007\(^3\). But there exist some problems that prevent potential users from participation in e-commerce processes. A lot of applications are too complex for people how do not have any technical background, and even if they are able to handle the application, searching for and finding a product or service that really fits to the consumers needs is very difficult if you do not know, what to look for.

Recommender systems like Smart Information System’s Smart Assistant support the user during this process and provide well-fitting products and services that are derived from the users needs within an interactive consultation process\(^4\). The Smart Assistant is based on Semantic-Web-data and is using ontology information to map customer needs to technical product attributes. To provide consultation solutions for a huge number of categories in future, community-driven Semantic-Web-data that gets updated continuously would be a great advantage for the working process. Today a lot of the Semantic-Web-data used within the Smart Assistant is created by the company via transformation of existing data interfaces.

**The ebSemantics-Project**

During the last years a lot of Semantic-Web-data has been produced and collected within the Linking-Open-Data-project\(^5\). Although this data collection contains only a few data sets that are relevant for e-commerce application, there exists a trend for representing information this way all over the internet.

An innovative Austrian project of the Austrian Federal Economic Chamber, Smart Information Systems, Austriapro and the Österreichwerbung, supported by the Federal Ministry for Economics and Labour (BMWA), is working on the integration of Semantic-Web-data for Austrian companies and web applications. Within this ebSemantics-project standardized ontologies for e-commerce applications and best practice use-cases are created and specified to provide a technical base for Austrian companies when getting started to develop Semantic-Web-applications.

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\(^2\) See [http://opentrust-project.com](http://opentrust-project.com) for details.  
\(^4\) See [http://www.esolda.at](http://www.esolda.at) for a demo application.  
\(^5\) See [http://www.w3.org/DesignIssues/LinkedData.html](http://www.w3.org/DesignIssues/LinkedData.html) for an introduction.
One part of the project is the extension of the FAZ using Semantic-Web-representation for information within the register. FAZ is the first implementation scenario for the Semantic-Web-Trust-Layer that is handled by a governmental organisation and already works in practice. The governmental background is important because all kind of solutions for the trust layer can only be as trustful as the real world organisation that maps the information to the web is.

**Legal issues and effects**

Using data information of the FAZ or using the FAZ to mark data of a third party application or database as trustful has a legal background that is no longer trivial according to the e-commerce and copyright law. We now want to discuss the legal aspects of the two main use cases here.

**Using data of the Firmen A-Z.** Within the new FAZ we have do differ between three types of information: (1) The basic company information that is obligatory for the business government agency, (2) additional information about the company that is optional but is also stored within the FAZ and (3) information about products and services based on ontologies developed within the ebSemantics⁶ project like accommodation details for hotels, gastro details or event information. For the basic company information the legal situation is quite clear: Because providing this information is obligatory by company law for every company in Austria the data itself is provided by the business government agency to the WKÖ without any restrictions. Therefore the WKÖ has all rights to provide this data to third parties or to use it in any application – the originators of this information, e.g. the companies, have no copyright on it by law. In this case it is up to the WKÖ to decide to whom and to what conditions this information is provided. On the other hand the WKÖ has a copyright on this data because they did invest in the development and structuring of this information and have some economic business models for selling it to third parties. In such a case the e-commerce law defines a generated copyright for the company - see [BR02], page 81 ff for details.

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6 See [http://www.ebsemantics.net](http://www.ebsemantics.net) for details

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Fig. 2: Basic company information in the WKÖ Firmen A-Z
Usage of such data can lead to legal problems and must be proven in detail, before someone implements a process integrating it. Here the Austrian e-commerce and copyright law differs between usage of “unwesentlichen” (marginal) and “wesentlichen” (fundamental) parts of the collected and structured data. This law is derived from a directive of the European Union for database usage\(^7\). Of course it is difficult to specify what is a marginal part and what is a fundamental part of a database – but at least if the claimant is able to prove a disprofit because of the defendant’s usage of the database, he might win the case.

For the additional information the situation is quite different, because here no general definition for the copyrights of this data exists. We have to take a closer look to the process of data retrieval here: Every member of the WKÖ, e.g. every Austrian company, gets an account to edit additional information about his company within the FAZ. The data is stored physical and logical within the FAZ database, e.g. it is structured based on a schema developed by the WKÖ using financial investment to produce the schema and the application. Without any further license definition the situation would not be clear, because in a potential court procedure it has to be decided who – the user or the WKÖ with its FAZ system – is doing the structuring of the data and therefore owns the copyright on it. But because the FAZ formulas include a license agreement the legal situation gets clear for this data too. In detail, the license agreement is of the following form:

“Mit der Eingabe von Daten erteile ich die Zustimmung, dass die Organisationen der gewerblichen Wirtschaft (Wirtschaftskammern und Fachorganisationen) diese Daten verarbeiten und veröffentlichen, indem sie diese im Internet als Ergebnis von Suchabfragen anzeigen und im Rahmen ihrer gesetzlichen Befugnisse zu Zwecken der Interessenvertretung und Mitgliederbetreuung verwenden und auch weitergeben dürfen.”

This does not mean that WKÖ now owns the copyright (although this could be the case nevertheless), but that WKÖ is allowed to use the additional company information for all kind of internal applications and furthermore to assign this permission to third party companies, organisations or private persons – either by a general license or, more restricted, by individual contracts of usage.

The situation for the product and service information is similar, but because no formula for this data and therefore no license agreement exist so far, we are not able to define, whether the situation will be exactly the same than for the additional company data.


The Semantic-Web-Trust-Layer 4/7
Linking databases to the Firmen A-Z. Within the e-commerce law the term database does not only refer to data that is stored physical or logical using a database management system but means all kind of data collection in a structured way (no physical storage is necessary at all to fulfil the term’s meaning). Companies now have the possibility to link to Semantic-Web-data out from their personal profile of the FAZ. These links mark the data that is linked as trustful – e.g. with publishing such a link the company confirms the information as trustful. Of course this step makes the information only as trustful as a company handles it, but in general this leads to a much higher quality than pure links without any trust-mechanism. In principle all kind of data can be linked from the company’s profile: A specific crawler than has to decide, which kind of data – e.g. what instances of special ontologies – should be retrieved and which should not.

The Linked Open Data Approach

Because an application that handles this data is leaving the FAZ application and therefore also the license domain, a general description about legal characteristics of data cannot be provided any longer. Either some kind of signature must be used now to classify the legal aspects or a human developer has to decide if the data can be used for a specific case or not. The best example for a huge dataset that can be used under a general open license is the Linking Open Data set. All Semantic-Web-resources and descriptions about them are under a Creative Commons\(^8\) or Talis\(^9\) license and therefore free for most use cases – you only have to add the copyright statement of the according license, which can be read out from the ontology directly in most cases.

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\(^8\) See [http://creativecommons.org/](http://creativecommons.org/)

Linked Open Data contains information about social networks, Wikipedia data, books, reviews and many others and is linked into each other (see Fig. 3) if references between different kind of sources – for example between people and books (“is Author of Book”) or cities described in Wikipedia and geo-information (“has longitude x, has latitude y”) – exist. This concept allows it to retrieve additional information for a lot of Semantic-Web-applications quite easy. For a FAZ use-case with links to databases outside the WKÖ domain one proper solution would therefore be to use the Linked Open Data approach\(^{10}\) to publish the trustful data of a company within the web – after all this combination, using FAZ for trust layer and LOD for representation strategy, might be one of the most promising one, if you are a company in Austria and want to bring your data to the Semantic Web.

**Social and economic effects**

“Real” Semantic-Web-data for many domains will lead to new, intelligent information systems within the internet, because if data is structured and includes intelligent information about how to use it, much more intelligent algorithmic processing is possible. Therefore higher quality regarding to search results and learning applications will be achievable in future and therefore make it even more attractive than today to use web applications to search for knowledge or buy products and services.

This, as a very strong information technology process, will lead to unexpected, huge transformation effects within society, as the German sociologist Dirk Baeker describes in \[BA07\]. The Semantic Web as an approach is mapping the knowledge and object network of the “real world” in such an intensive way that it really gets possible to compute new knowledge out from it efficiently and therefore to influence the development processes within both, virtual and real, world. Semantic-Web-based E-Commerce is one of the key concepts within this approach, because in history most transformations of society by technology have been transported and executed over economic processes first.

Of course parts like Linked Open Data and Firmen A-Z are not determining great technical or social revolutions, but they have potential to be important next steps within the approach to show best practice models and generate positive feedback for the Semantic Web idea in general and Semantic-Web-based E-Commerce in particular.

\(^{10}\) An XML-based description of a How-To can be found here [http://www4.wiwiss.fu-berlin.de/bizer/pub/LinkedDataTutorial/](http://www4.wiwiss.fu-berlin.de/bizer/pub/LinkedDataTutorial/)
Literature


Annotated Virtual Reference Resources (VRR)


