T-D7
Definition of a Learning Structure & Work-plan for the development of industrial modules

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Abstract

The objective of this deliverable is to provide an overall overview of the industrial learning structure. This learning structure is based on the curriculum developed for academics[1] in the Education and Training activity of REWERSE. The industrial learning structure enhances it including a business approach category addressing industry needs. The learning structure will be used as a framework so as to develop the industrial training modules. The report also gives guidelines about courses patterns, formats, duration, etc. Moreover, the deliverable at hand states about the creation of a committee which will give support to TTA activities. Finally, a complete work-plan of the activities to be carried out by the TTA activity regarding the development of industrial training modules is included.

Keyword List
Industrial learning structure, Semantic Web technologies, business scenarios, industrial training material

[1] See E-D7 “Graduate Education Curriculum on the Semantic Web - a first draft”

Definition of a Learning Structure & Work-plan for the development of industrial modules

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Abstract
The objective of this deliverable is to provide an overall overview of the industrial learning structure. This learning structure is based on the curriculum developed for academics in the Education and Training activity of REWERSE. The industrial learning structure enhances it including a business approach category addressing industry needs. The learning structure will be used as a framework so as to develop the industrial training modules. The report also gives guidelines about courses patterns, formats, duration, etc. Moreover, the deliverable at hand states about the creation of a committee which will give support to TTA activities. Finally, a complete work-plan of the activities to be carried out by the TTA activity regarding the development of industrial training modules is included.

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1 Introduction

This deliverable aims at giving a general vision of the industrial learning structure and reviews and refines the contents of T-D3 and T-D5. The industrial learning structure was firstly designed in T-D3. At this stage, we give an improved overview about the three-tiers learning structure model and the Semantic Web issues covered in each layer. This improved industrial learning structure tries to give a detailed overview about the contents which may be interesting from an industrial point of view. Moreover, the general structure includes an upper-layer called *Business approach* aiming at showing real Semantic Web applications, orientations about how to integrate the new technologies into the existing industrial systems and all the information related to make easy the use of new Semantic Web technologies by industry.

In the Annual Meeting which took place in Munich, REWERSE members decided to create a Program Committee to support the activities regarding the industrial learning modules preparation. Section 2 presents the members of this Committee and their responsibilities.

In the deliverables T-D3 and T-D5, we briefly gave some guidelines for adapting educational material addressing industrial needs. Section 4 presents a selection of possible educational formats which can help REWERSE members when developing industrial courses taking also into account former guidelines. The industrial formats are related to how to present the information while guidelines gave in former deliverables are more centred in what information is needed by industry audience.

Finally, a complete work-plan of the activities to be carried out by the TTA activity regarding the development of industrial training modules is included.

2 TTA committee and roles

The EU NoE REWERSE http://rewerse.net is presently working towards identifying and developing a core of introductory industrial courses. The courses should be supported by electronic learning material. The REWERSE participant responsible for this activity is Telefónica Spain (deputy coordinator TTA (Technology Transfer and Awareness)), but the content of the courses will be designed and developed in close cooperation with academic participants and with the REWERSE activity ET (Education and Training). For supporting this work with expert guidance a small Program Committee (PC) was created. Discussions at the annual meeting and seeing the need for a widespread support of the development of industrial training material by the majority of the REWERSE community led to the creation of this committee at the annual meeting in March 2006.

An example how the cooperation work between TTA/Telefónica and the PC would look like is given in the following:
As one of the next steps Telefónica needs to develop a framework which is basically a list of potential topics for industry that could be covered by specific working groups (WG) of REWERSE. In coherence to that, events and conferences would be listed where REWERSE members could hold their course. The goal is to have a list with a topic and the fitting potential event and maybe a suggestion for an author. This framework would be the basis for the PC to make the first contact to a potential course provider.

Consider the following scenario:
"In the first week of October there will be another Semantic Web Days with a one-day tutorial about Semantic Web Techniques in Bioinformatics. This is your field of expertise. We would like to have three tutorials of about two and a half hours each. Would you be willing to give one of these tutorials? It would be especially interesting if you could emphasize the use of reactivity rules in Genome Analysis you described at the last annual meeting."

This is a very concrete offer for a researcher. Therefore the chance that a researcher would give commitments is more likely. After the PC had made the first contact and got the commitment, Telefónica would now take over the coordination and organizational work (e.g. call for abstracts, collection of abstracts, coordinating the feedback procedure etc.). The members of the PC would be the contact persons who are willing to help when necessary.

The tasks of the committee will be:

- support in identifying a core of topics to be covered by industrial courses,
- to suggest and to address potential contributors,
- to evaluate the proposals and the course material,
- to discuss and to approve a uniform structure for the requested course material, to be proposed by Telefónica.

2.1 Program Committee

The following list contains the names of the REWERSE members who so far agreed to be member of the program committee. The list is a living document as names might be added or removed as, for instance, new members are interested in joining this committee.

- François Bry (REWERSE coordinator)
- Sara Carro Martínez (REWERSE TTA)
- Tim Geisler (REWERSE TTA)
- Norbert Eisinger (REWERSE ET)
- Jan Maluszynski (REWERSE ET)
- Silvie Spreeuwenberg (REWERSE member)
- Jérôme Euzenat (INRIA Rhône-Alpes)

François Bry is a member of the committee as he is coordinator of the whole network and has detailed insights and contacts to the whole REWERSE community. Sara Carro Martinez and Tim Geisler are also members of the Program Committee as they are (deputy-) coordinators of TTA activities. Jan Maluszynski and Norbert Eisinger are as (deputy-) coordinators of the Education & Training activity group of REWERSE, which also provides support for TTA activities, also members of this committee. Silvie Spreeuwenberg as a representative of a company and interested in courses for industry also joined the committee. Finally, Jérôme Euzenat from INRIA Rhône-Alpes as scientific vice-director of the NoE Knowledge Web is also a member and provides consequently the link to another Network of Excellence involved in similar activities.

3 Industrial learning structure

The following learning structure was designed from an industry perspective and addresses in particular the educational needs of professionals[2]. The structure serves as a kind of curriculum or guideline regarding the selection of courses. Curricula for professionals have also been developed by training institutions specialized on providing courses for industry. One institution to mention in this respect in particular is the Semantic Web School[3] located in Austria. The structure at hand takes into account the REWERSE topics and gives more a general overview than focusing on specific courses, but otherwise provides a similar perspective on Semantic Web education.

Please note that not all components of Semantic Web curriculum for professionals can and will be provided by REWERSE. There are only few topics that could be covered in content by REWERSE. The list of topics in this chapter shall not be seen as a list of courses but as an approach to identify topics for possible industry courses. These topics have not been agreed upon with other participants so far. At this stage there are no definite commitments of any participants to prepare and deliver an industrial course in this respect.

Reference should here be made also to the curriculum developed for academics[4] in the Education and Training activity of REWERSE. The curriculum developed for academics provides the basis for the European Academy for Semantic-Web Education[5] to be established by Knowledge Web with support of REWERSE and is also used for the categorization provided on REASE[6] (a repository for learning units about Semantic Web topics). Additionally, this categorisation is also applicable to the European Master program in Computational Logic, an integrated study program (see E-D7). The curriculum developed for academics focuses on a different target group with different needs compared to professionals. Hence, the proposed structure is different from the academic curriculum, although it has been taken into account as far as possible. The proposed structure needs to address professionals who want to learn step-by-step how to apply semantic technologies in their companies to solve specific problems. The core topics of the academic and industrial curriculum are similar. The major difference is business orientation of industrial courses which will enforce the theory presented.

[2] Industry needs and examples use cases were identified in former deliverables. See T-D3 and T-D5 for more details
[3] http://www.semantic-web.at/main.php
[4] See E-D7 “Graduate Education Curriculum on the Semantic Web - a first draft”
[5] http://www.semantic-web-academy.eu/
[6] http://rease.semanticweb.org

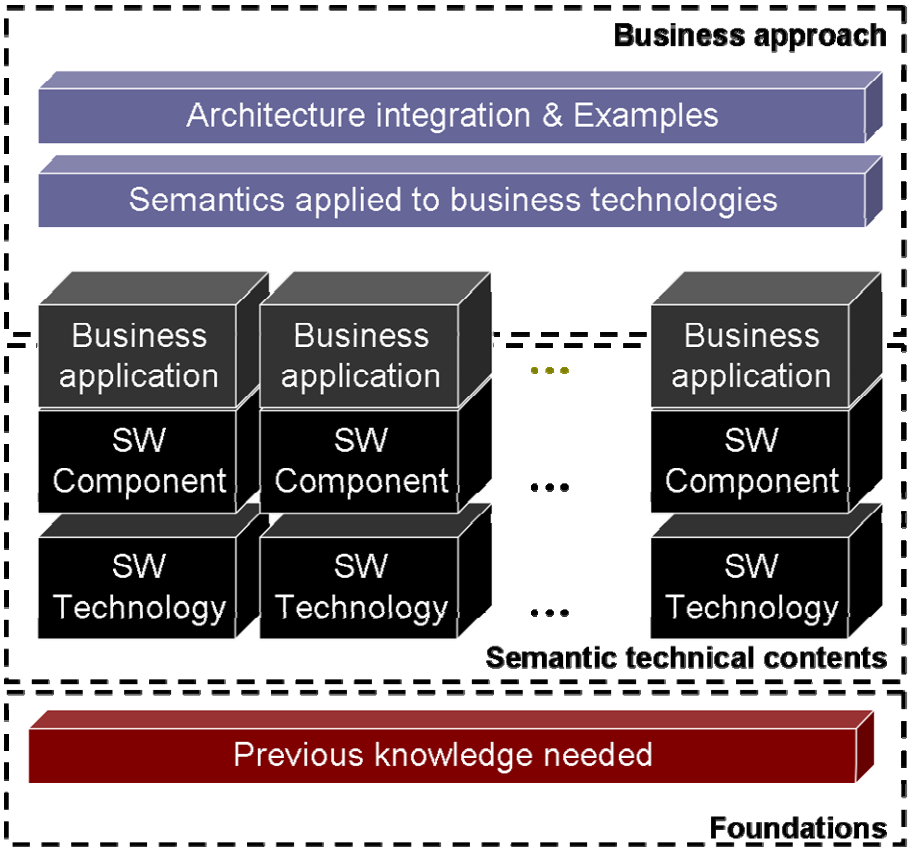

Figure 1 Industrial learning structure

The learning structure was divided into these three blocks so as to include as much as possible the needs of different enterprises. This means that employees of an industry with no knowledge about Semantic Web issues can make use of the Foundations block, in order to acquire the knowledge needed to continue learning the topics include in the upper-layers. On the other hand, employees with a former knowledge on Semantic Web foundations can start in the second level. But, both of them will be interested in Semantic Web industrial applications, examples or how to integrate these new applications into the existing systems.

The learning structure is given to show the whole educational context. This makes it easier to demonstrate where (that is, on what level) REWERSE could contribute courses. To finally provide a complete list of courses based on the learning structure for industry it would be important to find out whether other Networks of Excellence could cover some of the parts. To ensure efficiency one should avoid overlapping and unnecessarily extra work.

Consequently, courses which fit into REWERSE topics will be encouraged. In the next subsection, contents related to REWERSE topics are indicated whenever discussing a layer of the industrial learning structure more in detail.

3.1 Foundations

Foundations are the theoretical base for learning technical semantic concepts. When learning semantic technologies, some previous general knowledge is needed. Since the theoretical basic concepts are the same for industry and academic, the topics

included in this Foundations block are based on the Semantic Web Prerequisites[7] identified in the E-D7 deliverable, which defines a Semantic Web classification for academics. These foundations are divided in the following learning structure:

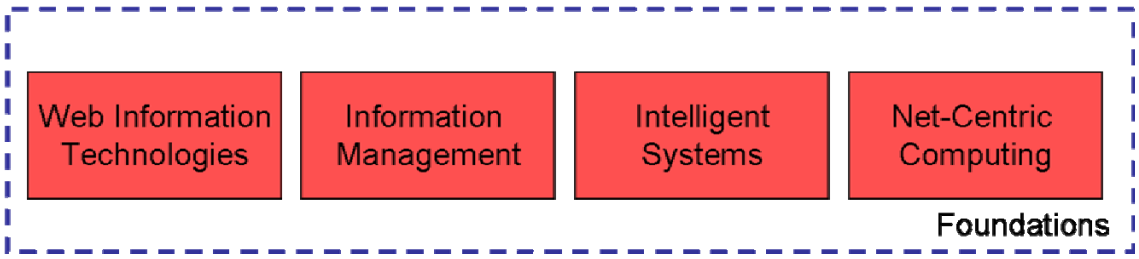

Figure 2 foundations structure

Following, the main topics of each block are included:

- Web Information Technologies:
  - XML (including Namespaces, Schema Languages, XML query and transformation languages, XML programming techniques),
  - Web data integration,
  - Security,
  - Web services,
  - Personalization techniques,
  - Web data extraction/information extraction,
  - Architecture of Web Information Systems.

- Information Management:
  - organization, transformation and presentation of information,
  - data modelling and abstraction,
  - security, privacy and protection in a shared environment,
  - data mining;
- Intelligent Systems:
  - knowledge representation and reasoning,
  - agents,
  - natural language processing;
- Net-Centric Computing:
  - Web standards and technologies,
  - Network security,
  - Distributed systems.

3.2 Semantic technical contents

The “Semantic technical contents” category groups the necessary knowledge that an IT professional or enterprise should have to work with Semantic Web technology. It is not really important to provide technical details, but instead a general structure to get a quick introduction to Semantic Web and how each semantic technology interacts. In the following, the different layers (SW technology and SW component) of the category “Semantic technical contents” will be described.

3.2.1 Semantic Web technologies

Semantic Web technologies are the base of the technical knowledge that an IT professional must acquire in order to start learning about SW technologies. These are the technologies that are going to be combined together in order to build Semantic Web applications for business purposes. Consequently, by learning these

[7] Classification included in the section 2.2 of E-D7 deliverable. See E-D7 for more details

technologies, the professional gains basic competence regarding the building of Semantic Web applications.
Although it will not be necessary to learn all Semantic Web technologies in order to apply semantic knowledge into business cases applications, all contents that are going to be used when applying Semantic Web technology to a specific business scenario. (as will be described in chapter 3.2.2) must be provided.

Figure 3 shows a layer organization of Semantic Web technologies.

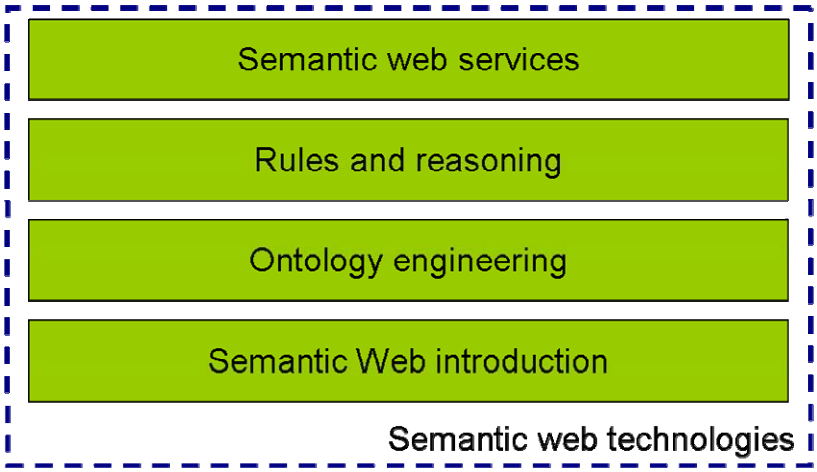

Figure 3 Semantic Web Technologies Layers

- Semantic Web introduction

Some introductory contents must be provided to IT professionals who are not familiar with Semantic Web technologies, so that they can get an overall idea of what these new technologies can provide and how these technologies can be used to complement their technical work. Please see chapter 5 "Selection of industrial courses contents" for further information about REWERSE contributions in this respect.

- Ontology engineering[8]

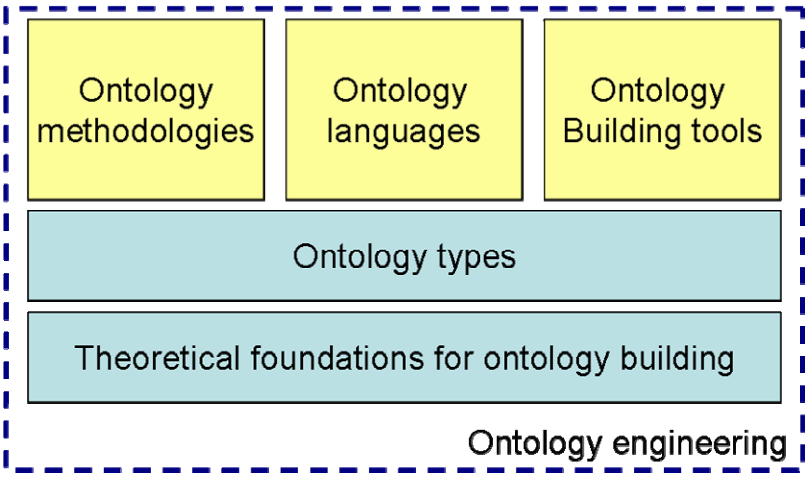

Figure 4. Ontology engineering

[8] *Ontological Engineering*, Gomez-Perez A; Fernandez-Lopez M; Corcho O, Springer 2004

- Ontology methodologies: This area includes all the developed methodologies or guides used at the time of building ontologies for a specific application
- Ontology languages: Nowadays, many applications take advantage of the features of ontologies. They are used in agent systems, knowledge management systems, and e-commerce platforms. They can also generate natural language, integrate intelligent information, provide semantic-based access to the Internet, and extract information from texts, etc. Several ontology languages have been developed during the last few years, and they will surely become ontology languages in the context of the Semantic Web. Among these ontology languages, we can distinguish the following:
  - Traditional Ontology Languages
    - Ontolingua and KIF
    - LOOM
    - OKBC
    - OCML
    - FLogic
  - Web Ontology Languages
    - SHOE
    - XOL
    - RDF(S): RDF and RDF Schema
    - OIL
    - DAML+OIL
    - OWL
- Ontology Building tools: There are many ontology building tools which can help users who have to deal with ontologies and its development. These building tools can be divided into several groups. The most representative building tool of each area are include:
  - Language-dependent ontology development tools, such as The Ontolingua Server or OntoSaurus, among others.
  - Extensible language-independent ontology development tools and tool suites, such as Protégé-2000 or WebODE .
- Ontology types
  - Knowledge Representation Ontologies
    - The Frame Ontology and the OKBC Ontology
    - RDF and RDF Schema knowledge representation ontologies
    - OIL knowledge representation ontology
    - DAML+OIL knowledge representation ontology
    - OWL knowledge representation ontology
    - Top-level Ontologies
    - Top-level ontologies of universals and particulars
  - Linguistic Ontologies
    - WordNet
    - EuroWordNet
    - The Generalized Upper Model
    - The Mikrokosmos ontology
    - SENSUS
  - Domain Ontologies
    - E-commerce ontologies
    - Medical ontologies
    - Engineering ontologies
    - Enterprise ontologies

- Chemistry ontologies
- Knowledge management ontologies

  - Theoretical foundations for ontology building: This layer will contain the theoretical foundations for ontology building, such as: definitions, components of ontologies, categorization of ontologies, principles for the design of ontologies, etc.

- Rules and reasoning

  - Rule Markup languages: This could include both existing rule markup languages and REWERSE rule languages.
  - Reasoning awareness: The integration of reasoning abilities into the query language (and therefore potentially the data access) promises a far more efficient and convenient means of data access. Nowadays, these query languages are still in an evolving process. However, they will contribute to the development of more efficient Semantic Web Components and Applications

Topics such as rules and reasoning are naturally particularly relevant for REWERSE.

- Semantic Web Services

Web services are designed to provide interoperability between diverse applications. Composing services dynamically to create new functionality is necessary when the required task cannot be realized directly by the existing services. There are several tools used to compose services but it is needed a human controller as the decision mechanism to accomplish this goal. The main problem is the gap between the concepts people use and the data computers interpret. We can overcome this barrier using Semantic Web technologies. So, it is interesting to include this technology in the industry learning structure to make it a useful and perdurable tool, although this technology is not covered by any REWERSE Working Group at this stage.

3.2.2 Semantic Web components

Nowadays, Semantic Web is an evolving concept. Several projects are working on applying Semantic Web Technologies to concrete independent research areas. All this research delivers some enhanced techniques and components which can be also applied to different business areas. Courses at this level are important since they make the enterprises realize how Semantic Web can help to enhance their business.

By now, we identify the following Semantic Web components as interesting for business cases. However, this is an open issue which can be extended during the REWERSE project in case of finding out about other promising research activities on Semantic Web Components.

- Web-based decision components

An efficient web-based decision solution should have a good basis on reasoning issues since they help to automate their procedures in an intelligent and efficient way. These decision systems should cover several kinds of data such as events, temporal and geographical data.

- Knowledge management

Knowledge management includes the processes of capturing, extracting, processing, and storing knowledge. Ontology-based applications in this field could be: Ontology-related inference engines, topic maps, content management, information retrieval and information visualization. This can also been applied to multimedia collections, where ontology technology offers a way to enable semantic modelling on objects, such as images and audio, that could be organized more easily and found more efficiently. It seems that this component could be applied to a wide range of industrial applications.

- Human Language technology

Human language technologies cover the natural language processing. This language processing can be used for business purposes, together with other Semantic Web components, to provide information extraction, evaluation, language engineering and generation or semantic metadata creation in a more natural way for humans, maintaining a human language approach.

- Personalized information systems

Optimizing the access to digital information according to the needs and requirements of each end user is the goal of Personalized Information Systems. By bringing the user's needs into the centre of interaction processes, Personalized Information Systems overcome the “one-size-fits-all“ paradigm and provide individually optimized access to Web data and information.

Moreover, success in business depends on forging strong relationships. Personalized information systems aim at giving the individual user optimal support in accessing, retrieving and storing information. From an industry point of view, it’s a means of meeting the customer’s needs more effectively and efficiently, making interactions faster and easier and, consequently, increasing customer satisfaction and customer service.

It is important to be aware that REWERSE cannot provide everything. It is essential to integrate partners in the industrial learning structure. REWERSE should concentrate on their topics and in that sense create courses that fit into the context. Consequently, the whole structure can be given to try to cover the most semantic issues possible, but REWERSE focuses only on some parts of the overall structure.

3.2.3 Business application

This block can be considered a part of the Semantic Web Components area. Courses should mention those business areas where Semantic Web Components are being used and also those areas which would improve its performance by using Semantic Web Components. This orientation will give a business vision which help enterprises to see the advantages of Semantic Web technologies.

3.3 Business approach

3.3.1 Why a business approach is necessary

Business modules will join theoretical and practical aspects through uses cases and business oriented learning. It is important to identify which are the problems and how they can be addressed using Semantic Web components. As it was formerly mentioned, these Semantic Web components are developed based on Semantic Web technologies trends.

The business approach tries to explain, how Semantic Web components can be used to solve industry problems or enhance business services and integration problems. Consequently, all content in the business approach focuses on business scenarios and good practise aspects.

For every Semantic Web component covered with developed courses and learning materials, it's important to outline some business scenario approaches. This way, we expect that industrial audience will become more interested in Semantic Web contents by realising how Semantic Web can be applied to their systems, improving their performance.

Furthermore, as Semantic Web technologies get more and more mature, some of semantic integration among enterprise applications problems starts getting solved. A lot of intra and inter enterprise integration makes good use of semantic technologies saving a lot of money to them. That is why some specific business semantic technologies should be part of a complete industrial learning structure, although not being researched under REWERSE consortium.

At this stage, the following business scenarios have been refined from T-D3. Due to the importance of business technologies, a complete structure for semantic contents applied to these areas is going to be presented. REWERSE material will not be able to cover it, but getting contents from other semantic sources (such as other EU projects or institutions such as the Semantic Web School) could be useful in order to get a more complete learning structure which could be interesting to IT enterprises.

3.3.2 Semantics applied to business technologies structure

The following figure shows the structure of semantic learning contents which would cover business technologies:

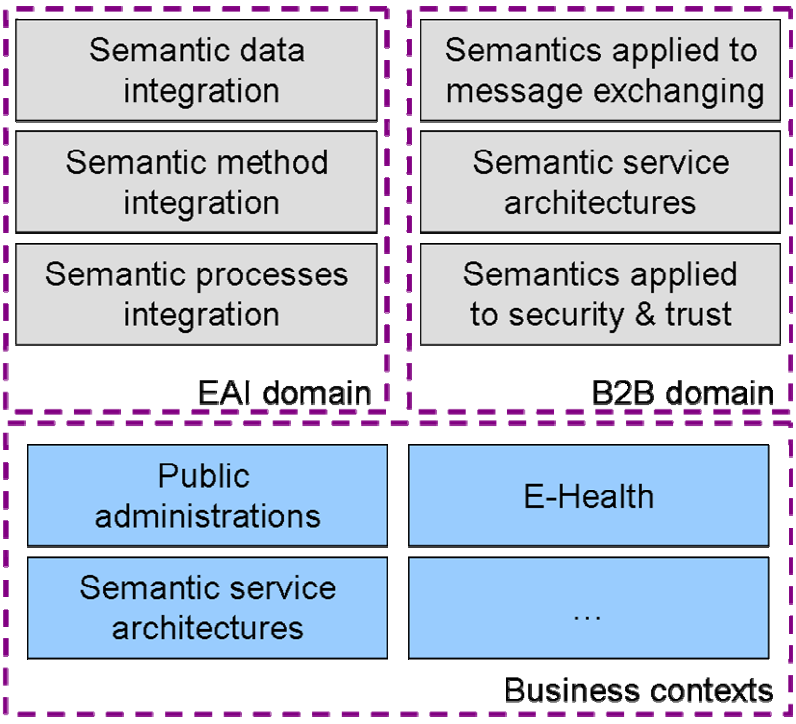

Figure 5. Semantics applied to Business Technologies

This structure is divided in the following categories and contents types:

- Business contexts

These are learning contents that could fit any business contexts and could be related to ontologies created within these contents, semantically enriched standards or semantically enhanced tools, for example.
Some sub-divisions could be public administrations, e-Health or specific business architectures for chemical issues, for example.
More business contexts could be derived inside REWERSE consortium. Bioinformatics research could fit this learning category.

- EAI domain

EAI domain covers all business technologies specific to intra-enterprise application integration. EAI technologies can be improved by semantic technologies, so some learning contents about these issues would be very valuable to enterprises. These technologies are divided into these sub-categories:

  - Data integration technologies (e.g.: database middleware).
  - Method integration technologies (e.g.: semantic-based frameworks).
  - Business processes integration (e.g.: Semantic Web services orchestration and choreography).

- B2B domain:

B2B domain covers all business technologies specific to inter-enterprise interactions. When facing B2B domain applications, communications between enterprises can be improved using semantic technologies, especially in these sub-areas:

  - Message exchanging (e.g.: EDI based standards semantic researches).
  - Semantic SOA architectures, which can be designed using semantic approaches in order to get a better interoperability (e.g.: semantic data negotiation between enterprises).
  - Semantics applied to security issues: semantic technologies are being applied to trust issues, for example.

3.3.3 Architecture integration & Examples

This is a crucial layer of the industrial learning structure. It has a guidance function more than a learning function. Enterprises want to know how Semantic Web can be integrated into their actual web-based systems and what is more important regarding the benefits Semantic Web offers. This way they can realise how new semantic-based development can integrate into their actual traditional-web architecture, combining them instead of replacing all their already developed software.

Although REWERSE researches are not focused on business applications and surely they will not be able to provide this kind of contents, a complete structure for industrial training should cover these issues because this information is getting more and more valuable to enterprises which start using semantic technologies nowadays.

In this sense, courses should give also information about:

- Semantic Web risks adoption.
- Estimations of benefits and costs.
- Previous experiences in Semantic Web applications adoption and integration.
- How their future systems would like.

On the other hand, examples and demos will help enterprises to really understand the theory and see by themselves similarities and differences with their business cases. So, as a first draft courses should also:

- Provide a first impression about the power and utility of Semantic Web.
- Provide general approaches to integrate Semantic Web technologies into concrete business applications, instead of providing specific solutions for a concrete business scenario.
- Make them realize their weak points and therefore makes Semantic Web a need to them

It will be needed to contact institutions and companies who can provide guidance and examples. Probably, these contributors should be related to business areas so as to give a true-real vision about the use and integration of Semantic Web technologies into enterprises.

3.4 REASE courses with outreach to industry

The online platform REASE, a joint project between the NoEs REWERSE and Knowledge Web provides course material for industry which could be used mainly as basis for Semantic Web tutorials. For further details about REASE, one can consult the deliverables E-D6 and E-D7 in which REASE has been described from an academic and a technology transfer viewpoint.

To adapt the material provided on REASE one needs to be aware that courses on REASE cannot be used as they are. The structure in REASE addresses in the first place higher educated people who like to exchange, communicate, cooperate or distribute information relevant in the Semantic Web field. As said before, REASE is based on an academic categorisation, developed by the activity group of REWERSE Education & Training and NoE Knowledge Web.

Nevertheless the material provided on REASE is quite well suited for introduction courses for industry. But it is essential to integrate REASE material in a proper course model for industry. Self-learning-formats (SLF) seem to be the most feasible format in that sense (see later in chapter 4).

At the moment there are 21 learning resources on REASE To get an overview see: http://rease.semanticweb.org
None of the courses are provided by REWERSE members. The explanation lies in the fact, that research in REWERSE has been for two years now and it is difficult to have digital course material for professionals such early in a research phase. However, it is desired to populate REASE portal with industrial courses developed by REWERSE members as they are available.

4 Industrial learning material formats

This section aims at giving a first approach about format, duration, patterns and similar issues of the developed industry-oriented learning material. The formats exposed in this section are not mandatory. They are just suggestions which can be used by partners involved in the development of courses and try to give an orientation for different needs that could come up in the near future.

First of all, we consider that it is interesting to identify different learning situations and then detail the features of the learning material. The term “learning situations” means possible ways of presenting contents of courses.

- Self-learning format

Self-learning units will be divided into several topics. It will provide similar contents, such as training courses. However, presentation should be interactive and attractive to catch user attention. A simple slide set is not appropriate in this case. Possibilities to improve a slide set are to create a web-based application or even a flash application. Additionally some kind of film production is thinkable. Furthermore, the slide set can be also accompanied by additional reading material which would give more details about a specific issue. This last proposed solution would be one of the easiest to implement. A further refinement would be to divide course contents into small units and provide test units in order to make user an active part of the learning task.

Self-learning units seem to be in general the most feasible format for REWERSE in order to develop courses for industry. One needs to take into account that REWERSE is a European network that contains 27 institutions, most of them universities. Researchers involved in the network have developed interesting and complete academic courses. Since the theoretical basis can be reused, it might be easier for researchers as potential course provider to use already existing material and implement it in a self-learning-unit as described above. Additionally, the incentive to produce a course for industry would have to be combined with the possibility to give a face-to-face course. The material used for a face-to-face course/workshop targeted at an industry audience could then be converted to a self-learning format as described above.

Furthermore, self-learning formats have the advantage that there are permanently useable and available for instance on REASE.

	Self-learning format
Duration	2-4 hours per module.
Presentation	Interactive.
Format	Slide-like with short (1/2 to 1 A4 page of text) excerpts.
Contents	The contents covered by a self-learning module should be the same than a training module, but taking into account that no teacher will explain the examples and answer the questions, so a step by step approach must be followed.

The following formats should be seen only as possible formats. Implementations of these formats depend very much on the actual conditions and particular possibilities.

- Seminar format

Seminars are training modules which are organized in the form of several days or one concentrated day. Seminars cover all the overall learning structure, from introductory courses to several complex applications that can be built using Semantic Web technologies. They usually require some training staff, where several semantic experts can explain different semantic topics starting with more basic topics and then evolving to more complex topics.

For a seminar format, lectures could be more extensive, because more technical content is going to be provided, and we will not focus on introducing the semantic technology only, but also cover it, providing examples and more technical content. Two hours could be a reasonable length for each lecture in a seminar format.

	Seminar format
Duration	For one day seminar, all day will be required. 2 or three lectures in the morning and another one or two lectures in the afternoon can be provided. We must take care of quite extensive breaks between the lectures, and to fix the lunch hour. For several days seminar, some format similar to Summer School courses can be adopted.
Presentation	Oral, some graphical aid.
Format	PPT slides. Some seminar booklet can be provided.
Contents	A seminar booklet would be very helpful in order to give an overview of the seminar and the contents which are going to be presented and in which order.

- Lecture format

Lectures around a common Semantic Web topic can also be organised. Several speakers should prepare material about different aspects of the selected topic. It seems convenient that the format of this material would be a slide set and the duration of each presentation 45 minutes approximately avoiding people tiredness. It will be also useful to prepare a guide which summarizes all the contents of lecture to the audience.

A frame to implement this lecture format could be an information day, organised by REWERSE and addressed to a special target group. To achieve that, cooperations with other networks or educational institutions are essential. Plans are currently under discussion.

	Lecture format
Duration	Up to three independent sessions of 45 minutes each, with some break between them (5 minutes while next lecture is prepared).
Presentation	Oral, some graphical aid.
Format	PPT slides.
Contents	Important to provide some bibliography for further studies. PPTs should have blank zones to allow participant to write down notes while they are listening the lecture.

- Tutorial format

Tutorials will deal with a particular Semantic Web issue. A speaker should prepare material in the form of a slide set and duration of at least 2 or 3 hours to give a

complete overview about the topic to the audience. It should be completed providing examples & common exercises to get students interaction.

Thinkable in that sense could be to offer a tutorial on a REWERSE related topic at a specific event that is focused on industry. The WG I4 is currently planning to give a tutorial on RDF at the XML Tage in Berlin (25-27. September 2006). Using the material for the tutorial it will be fairly easy for the WG to produce self-learning material as described above. The course material would then be available on REASE.

TTA is currently developing a list of events on Semantic Web topics, where REWERSE tutorials could be offered. A few of the events will be organised by REWERSE such as the Semantic Web Days[9] or the Summer School "Reasoning Web"[10]. External events are for instance the Semantics (Vienna), XML Tage (Berlin)[11] or the industry forum of the ESWC[12]. The tutorial format is desired, because lecturers are more motivated to develop a course when they have the chance to hold a face-to-face course. Researchers usually do not like to produce material for which they have no guarantee that somebody would look at it.

	Tutorial format
Duration	2-3 hours (reading time).
Presentation	Reading.
Format	PDF contents + PPT slides to sum up more important topics.
Contents	For tutorial format, a more complete written content must be provided. The audience has to do all the work on their own, so all contents must be provided in a PDF format, as clear as possible. Some PPT content can be provided to follow the tutorial structure and to give a summary for the content. Exercises could be added to test if what it has been explained is really understood by IT professionals.

- Training format

This "learning situation" involves at least 20 or 30 teaching hours. It might be more oriented to technical workers who use the Semantic Web technologies and components directly. Teachers can use slide sets during lectures, although it would be interesting to provide technical workers with documentation and related information. Tutorial material units can be reused and joined to compose a complete training course.

	Training format
Duration	20-30 hours.
Presentation	Oral, reading, examples.
Format	Booklet.
Contents	For a tutorial format, contents should be more practical oriented. IT professionals will expect to learn to build their own semantic examples or even small applications with the semantic expert guidance. Sessions must exchange theory and example explanations with self coding time. Some example patterns must be provided, so that assistants can complete them and build their own code with this pattern guidance.

[9] http://www.semantic-web-days.net
[10] http://reasoningweb.org
[11] http://www.berliner-xmltage.de/
[12] http://www.eswc2006.org/

These formats give a general overview about how industrial material can be presented to industry audiences. Each format addresses industrial specific needs. For instance, programmers who need an intensive knowledge in some Semantic Web area a training format will be the most suitable format. Whereas executives and managers just need a general overview about how these technologies or applications can enhance the production and performance of their enterprises. Here, a lecture format will be very useful. These two brief scenarios are given in order to understand why these formats match the needs of education for professionals.

4.1 General structure of industry material

All industry material should follow a common structure:

- Summary or abstract about contents of course
- Business scenarios applications
- Examples & demos
- References to extra material which can be used by students to study in depth the Semantic Web area or topic covered by the industrial course
    - References to outstanding textbook
    - References to standards.
- Copyright issues, distribution issues to be discussed.

5 Work-plan for the development of industrial training modules

5.1 TTA planning

The creation of introductory material is independent of the following timeline. For introductory material cooperations with other projects such as SEKT should be sought. Their material can be reused and adapted.

subject	responsibility	time
Preparatory steps as described in chapter 2 (list of topics and events)	Telefónica (feedback provided by PC)	September 2006
Contacting potential REWERSE partners	PC in consultation with Telefónica	September/October 2006
Collection of commitments of the partners and call for abstracts (table of contents)	Telefónica	December 2006
Collection of the abstracts and if necessary contact them repeatedly to receive the abstracts	Telefónica	January 2007
Review and feedback of the abstracts, send feedback to Telefónica	PC	March 2007
1. Ensure that the feedback is sent to the partners (contributors) 2. collection of the presentation slides + additional material as first draft version of the course 3. In case of f2f courses: digitalizing after the course was held at a specific event	Telefónica; in case of need with the support of the PC Telefónica REWERSE partners, Telefónica	June 2007 Depends on event dates
Description of the results in TD-11	Telefónica	September 2007
Last version of existing courses after a last review of the PC (maybe additional courses/modules have been added)	PC	January 2008
Description of further development, conclusion and forecast in TD-13	Telefónica	February 2008

The timeline for the creation of training material is influenced by events where training modules in the form of workshops/tutorials can be held. Consequently, for some cases, the production of the final training material can be at an earlier or at a later date.

6 Conclusion

In this deliverable, we have presented a complete and improved industrial learning structure taking as basis the work carried out in T-D3. This learning structure will be used as a guide at the time of developing industrial courses and also as validation at the end of the project. The developed industrial training modules will be included in REASE so as to fulfil the requirement of create a durable industrial infrastructure. But this infrastructure should be a living element even when the project finishes. Contents, courses and Semantic Web technologies should be periodically reviewed in order to maintain it updated.

The improvements of the learning structure proposed on T-D3 are focus on the introduction of a new layer called *Business approach*. This is a crucial layer of the industrial learning structure. It has a guidance function more than a learning function. Enterprises want to know how Semantic Web can be integrated into their actual web-based systems and what is more important regarding the benefits Semantic Web offers. This way they can realise how new semantic-based development can integrate into their actual traditional-web architecture, combining them instead of replacing all their already developed software.
Moreover, for every Semantic Web component covered with developed courses and learning materials, it's important to outline some business scenario approaches. This way, we expect that industrial audience will become more interested in Semantic Web contents by realising how Semantic Web can be applied to their systems, improving their performance.

The future work consists of:

- Selection of industrial contents.
- Review the events where industrial courses can be included.
- Agree on this first selection of industrial contents with the Program Committee, as well as identify REWERSE expertise members in each area who can address the development of industrial courses.
- Revise the industrial courses developed

The nature of this work is iterative and incremental. Results of the TTA planning will be included in future deliverables:

- T-D11. Revised list of industrial training modules.
- T-D13. The final list of industrial training modules and its use.

We will also cooperate in close relation with REASE, as it is planned to provide industrial contents to this semantic repository.