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Final Plan for Using and Disseminating the Knowledge

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Revision [1]

Final plan for using and disseminating the knowledge

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1 Introduction

In this plan for using and disseminating the knowledge we set out the terms of use and dissemination of the knowledge arising from the LT4eL project. The plan contains three sections:

- Section 1 - Exploitable knowledge and its Use
- Section 2 – Dissemination of knowledge
- Section 3 - Publishable results

2 Exploitable knowledge and its Use

This section presents exploitable results, defined as knowledge having potential

- for industrial or commercial application in research activities or
- for developing, creating or marketing a product or process or
- for creating or providing a service

It provides an overview, per exploitable result, of how the knowledge produced within the project could be exploited or used in further research. It contains an overview table accompanied by a short text, per exploitable result, including a description of the result and a plan for its use or exploitation.

Overview table

Exploitable Material	Sector of Application	Timetable for use	Patent or other IPR protection	Owners and other partner involved
A) Corpus of Learning Objects	Research & eLearning industry	final version: 2008	IPR free	all partners
B) Tool for metadata generation: keyword extractor	Research & eLearning industry	final version: 2008	IPR/patent free	all partners
C) Tool for glossary generation: glossary candidate detector	Research & eLearning industry	final version: 2008	IPR/patent free	all partners
D) Domain specific ontology and language specific vocabularies	Research & eLearning industry	final version: 2008	IPR/patent free	all partners
E) ILIAS integrated functionalities	eLearning	final version: 2008	IPR/patent free	all partners
F) Validation methodology	Research + eLearning industry	2008	IPR/patent free	all partners

2.1 A) Corpus of learning objects

2.1.1 Description

This corpus consists of more than the 200000 words (1000 pages) of learning objects we are supposed to deliver for each language represented in the consortium. The broad domain of this collection is computing. More specific subdomains include teaching academic skills, creating webpages, basic computer skills. All material has been linguistically annotated at least up to the level of part-of-speech tagging and morphological analysis. Besides, it has been marked up with (i) key words, (ii) definitory contexts. The complete annotated corpus has been delivered at month 12 (December 2006). During the second year of the project, an extra annotation layer was added to the objects with ontological annotation of concepts. In the last phase of the project, several learning objects have been added and have been annotated with the various layers of linguistic information.

2.1.2 Use and exploitation

The relevance of this corpus lies essentially in its use for the development of the new functionalities within the project. However, a subcorpus has been created with IPR free documents in order to make it publicly available in the ILIAS library, but also on the project website. As potential users we identify ILIAS end-users (teachers and students) interested in the content of the documents, but also the whole scientific community, notably other eLearning projects like iCamp (<http://www.icamp-project.org/>), as well as NLP and SW projects. The latter can use the multilingual corpus - which, if necessary, could be easily annotated with other levels of annotation - as a data base for further experimental research, for example, in language technology and natural language processing. The corpus is particularly useful because it encodes eight languages and it has been annotated not only with morphological information but also with definitions, keywords and concepts. The **Babylon and Ontology** European project (<http://www.bonynetwork.eu/>) might also be interested in the corpus with annotated concepts. Knowledge about the availability of this corpus will be disseminated via the usual channels (project webportal, mailing lists such as the corpora list).

Corpus of Learning Objects

Language	No of words	Can be used					Cannot be used		Totals	
		Author	Permission	Gov	GPL	free for research	copyright	unknown	Can be used	Cannot be used
Bulgarian	207.239			76.793		118.223		12.223	195.016	12.223
Czech	1.316.988	332.803	707.990	104.571	162.859			8.765	1.308.223	8.765
Dutch	442.559	127.963		42.867	25.860	115.408		130.461	312.098	130.461
English	1.162.564	219.133		2.336	33.587	162.758	497.343	247.407	417.814	744.750
German	355.043	1.600	60.200			72.194	50.165	170.884	133.994	221.049
Maltese	52.668	16.226				25.491		10.951	41.717	10.951
Polish	656.800	30.660			83.425	189.855	232.545	120.315	303.940	352.860
Portuguese	548.998	315.359			11.400	57.474		164.765	384.223	164.765
Romanian	644.292	439.631		43.889		147.500		13.272	631.020	13.272

2.2 B) Tool for metadata generation: keyword extractor

2.2.1 Description

One of the aims of the project is to improve the retrieval and accessibility of content through the identification of the learning material by means of descriptive metadata. To this end, we have employed available language technology tools and resources to develop a keyword extractor that facilitates the semi-automatic generation of metadata. The keyword extractor, is a tool that supports authors and content managers in selecting, in the chosen learning objects, the keywords that best represent the topic(s) of these learning objects. The tool analyses a set of annotated documents and returns the best keyword candidates for each learning object. The user of this functionality decides on the inclusion of these candidates into the metadata. The tool has been tested on eight languages (i.e. Bulgarian, Czech, Dutch, English, German, Polish, Portuguese, Romanian) and it can be used stand-alone or within the ILIAS Learning Management System.

We have assumed that the addition of this functionality will improve the retrieval of the learning objects in terms of their content. The validation results available confirm this hypothesis. The tool has been fully documented. The documentation is essential not only for a proper integration within the ILIAS system, but also for the integration within other LMSs that will be interested in adopting it. The final version of the tool is delivered at month 30 (May 2008). Documentation can be found on the project website (<http://www.lt4el.eu>), and sourceforge.net open source community (<http://sourceforge.net/projects/lt4el/>).

2.2.2 Use and exploitation

The keyword extractor has been integrated into the Learning Management System ILIAS. To favor further exploitation, it has been offered independently as web service so that it can be used by other applications as well. Full integration into other LMSs is thus also possible. To foster implementation into other systems, a document describing the integration process into ILIAS (a step-by-step integration manual) has been provided targeted at developers of other LMSs. Beyond direct exploitation in the eLearning industry, the development of the keyword extractor has had an impact on the scientific community. The functionality uses state-of-the-art LT and NLP technologies and therefore can provide useful feedbacks to these communities and be the starting point for utilization of these technologies into other domains. Several papers describing the keyword extractor have been accepted at international conferences (cf. deliverables 6.1b and 6.1c)

2.3 C) Tool for glossary generation: glossary candidate detector

2.3.1 Description

Dictionaries constitute an important support to the learning process. One of the assumptions of the LT4eL project is that they can be especially useful if they are constructed on the basis of the definitions extracted from a given learning object. To this end, we have employed available language technology tools and

resources to develop a glossary candidate detector. The glossary candidate detector is a tool that supports authors and content managers in creating glossaries by identifying definitory contexts in a text that contains the term to be defined and its definition. The input of this tool are annotated texts (and background resources). The output of this tool is a set of candidates for definitions that are extracted by means of pattern based grammars. For certain languages (i.e. Dutch, English, Polish and Portuguese) we have experimented with filtering wrong definitions by using Machine Learning techniques. The user decides on the inclusion of the candidate definitions into the dictionary which is then attached to the learning object. The tool has been tested on eight languages (i.e. Bulgarian, Czech, Dutch, English, German, Polish, Portuguese, Romanian) and it can be used stand-alone or within the ILIAS Learning Management System.

The validation results available show that the possibility to search for definitions based on the available glossaries has been highly appreciated by learners. The tool has been fully documented. The documentation is essential not only for a proper integration within the ILIAS system, but also for the integration within other LMSs that will be interested in adopting it. The final version of the tool is delivered at month 30 (May 2008). Documentation can be found on the project website (<http://www.lt4el.eu>) and sourceforge.net open source community (<http://sourceforge.net/projects/lt4el/>).

2.3.2 Use and exploitation

The glossary candidate detector has been integrated into the Learning Management System ILIAS. To favor further exploitation, it has been offered independently as web service so that it can be used on the internet by other applications as well. Full integration into other LMSs is thus also possible. To foster implementation into other systems, a document describing the integration process into ILIAS (a step-by-step integration manual) has been provided targeted at developers of other LMSs. Beyond direct exploitation in the eLearning industry, the development of the glossary candidate detector has had an impact on the scientific community. The functionality uses state-of-the-art LT and NLP technologies and therefore can provide useful feedbacks to these communities and be the starting point for utilization of these technologies into other domains. Several papers describing the glossary candidate detector for the various languages have been presented at international conferences (cf. deliverables 61.b and 6.1c)

2.4 D) Domain specific ontology and language specific vocabularies

2.4.1 Description

The domain specific ontology (i.e. computing) is developed in a language independent way and comprises more than 1000 concepts. An English vocabulary is mapped to the concepts and the relations within the ontology. In addition, language specific domain vocabularies have been developed and linked to the ontology for all the nine languages of the consortium. The domain specific ontology was delivered at month 12 (December 2006), and the language specific vocabularies at month 18 (May 2007). In month 24 we delivered a new version of the ontology which contains additional 200 concepts and related lexica. In month 30 (May 2008), we deliver the final version of the ontology. At the moment, the ontology contains 1002 domain concepts, 169 concepts from OntoWordNet and 105 concepts from DOLCE Ultralite. It also contains more than 100 object properties.

The ontology is being used to structure, query and navigate through the learning objects that are part of a Learning Management System. The ontology can play two major roles:

- Classification of learning objects. Each learning object is connected to a set of concepts in the ontology. This classification allows ontological search, i.e. search based on concepts and their interrelations within the ontology.
- Multilingual search for learning objects. In this case the ontology plays the role of Interlingua between the different languages. Thus the user might specify the query in one language and get learning objects in other language(s).

The innovative aspects of this part of the project consist firstly in the application of semantic web technologies (ontologies) to facilitate learning processes and, secondly, in their use (linked to language specific vocabularies) to address problems of multilingual nature, in particular multilingual search.

The ontology in combination with the lexica and the learning objects have been used for ontology browsing and semantic search. The software developed to this end has been fully documented. The documentation is essential not only for a proper integration within the ILIAS system, but also for the integration within other LMSs that will be interested in adopting it. The final version of the ontology browsing and semantic search is delivered at month 30 (May 2008). Documentation can be found on the project website (<http://www.lt4el.eu>) and sourceforge.net open source community (<http://sourceforge.net/projects/lt4el/>).

2.4.2 Use and exploitation

From the perspective of our project, the relevance of these semantic web technologies lies essentially in their use within an LMS to improve the organization and the retrieval of the learning objects across languages. Potential users in this respect will be LMS (notably ILIAS) end-users, but mostly LMS developers, open source as well as commercial. Documentation of the ontology development and a report for its integration within an LMS has been provided to facilitate its utilization in any eLearning platform. The results obtained have also had a clear scientific impact. The use of ontologies for multilingual retrieval is in its infancy. We have contributed to the development of these techniques and to provide important feedbacks to the semantic web community on the potential of their technology in this field. The ontology and the lexica developed in the LT4eL project have been distributed to:

- OU-UK and the KMI group (Enrico Motta and Mathieu d'Aquin) for reuse through the Watson ontology search engine which is being maintained by OU-UK.
- DFKI (Paul Buitelaar) for reuse through Ontoselect, which is an ontology library being maintained by DFKI;
- CNR Rome - Laboratory of Applied Ontology (Aldo Gangemi, Alfio Gliozzo) to be reused in their project eu project Babylon and Ontology (<http://www.bonynetwork.eu/>);
- APOSDLE (<http://www.aposdle.tugraz.at>) (Stefanie Lindstaedt and Luciano Serafini) for reuse within their project.

In this way, we ensure exploitation of the ontology beyond the project and reuse by the Semantic Web community. The developed ontologies, and in particular the methodology to link these to language specific vocabularies, will be further disseminated via the usual channels to be used by the scientific and semantic web community for further research. We have already written several papers on this topic, which have been presented at conferences (cf. Deliverable 6.1b and 6.1c). We believe that the use of ontologies in eLearning is one of the most innovative aspect of our project with much potential as it appears from our validation results as well as the peer review comments that we receive for submitted papers on the subject. It was particularly this aspect that was found innovative and a motivation for the best scientific paper award we have received at EC-TEL 2007.

2.5 E) ILIAS integrated functionalities

2.5.1 Description

The tools described above (keyword extractor, glossary candidate detector and ontologies for multilingual retrieval) have been integrated within the ILIAS system. ILIAS is a web-based learning management system and allows users to create, edit and publish learning and teaching material in an integrated system with a normal web browser. Tools for cooperative working and communication are included as well. ILIAS is available as open source software under the GNU General Public License. The software development worldwide is coordinated by the team at the University of Cologne.

The last release (3.5.0) of ILIAS before the project already offered content authors the possibility of annotating learning objects with metadata based on the LOM standard. Also a metadata based search is available. However, the metadata had to be provided manually by the author. This made the annotation process very time consuming and thus only a few authors provide useful metadata. Tools for semi-automatic metadata generation could help to solve this problem. Furthermore, ILIAS does not provide semantic web based functionalities, but it already offers the possibility of reusing learning objects like media objects or glossary items in the creation process of learning material. Ontology based retrieval of learning objects will considerably improve the task of reusing learning objects since ontologies will allow for intelligent searching and navigation in huge amounts of data. Metadata annotation and ontology driven

search and navigation allow for individual content assemblance for learners. Learners will be able to build individual learning paths by entering key terms of concepts they need to learn. The validation results showed that ILIAS enhanced with the functionalities developed in the project provides a suitable environment for personalization of the learning path.

2.5.2 Exploitation and Use

The main users of these integrated functionalities are ILIAS end-users (teachers and students). The scenarios produced in the context of our validation have also been developed having these users in mind, cf. deliverable 5.1c for further details.

To promote the use of the newly developed functionalities, the ILIAS English user manual has been extended with detailed descriptions of these functionalities. The user documentation has been distributed online via the ILIAS website as well as via the project website. To distribute ILIAS with the newly integrated functionalities, the project is also maintained at two open source communities, namely SourceForge.net and Ohloh.net. Clearly the functionalities could be integrated in other systems and applications since they have been implemented as web services. The package for installation of ILIAS enhanced with LT4eL functionalities can be also downloaded through the project web page.

2.6 F) Validation methodology

2.6.1 Description and exploitation

A suitable validation methodology has been developed and applied to the validation of the new functionalities as well as to their integrated set into ILIAS. eLearning applications are very much an emerging field, and there are no standard, general methodologies that can be used to validate effectiveness of the learning process in our specific context. We expect the methodology developed within the LT4eL project to be at least a first step towards this missing standard. To promote dissemination, and thus exploitation, papers on the subject will be written and presented at conference even beyond the end of the project.

3 Dissemination of knowledge

3.1 Overview table

Planned/actual date	Type	Type of audience	Countries addressed	Size of audience	Partner(s) involved
2008 / 2009	Workshop: projects on eLearning: TEL research in the Netherlands: on the continuity of the TEL research in the Netherlands and the relation between LT4eL and LTfLL (in cooperation with OU, The Netherlands)	eLearning, Higher education, Government	The Netherlands	40	UU
2008 / 2009	Workshop on integration of LT4eL functionalities in LMS	Interested LSM developers	Europe	50	ETHZ/all
20-21 November 2008	Presentation: Gaby Bergedorf and Susanne Jekat. <i>Mehrsprachiges Wissensmanagement</i> (in German). To be presented at the 5th Days of Swiss Linguistics (http://www.zhaw.ch/de/linguistik/5tdl.html).	Research	Switzerland	35	ZHW
8-10 September 2008	Paper + presentation: António Branco and Rosa del Gaudio. <i>Supporting E-learning with Language Technology for Portuguese</i> . PROPOR 2008	Research	Portugal	40	FFCUL
8-12 September 2008	Paper + presentation: Adam Przepiórkowski, Michał Marcińczuk, Łukasz Degórski. <i>Dealing with Small, Noisy and Imbalanced Data: Machine Learning or Manual Grammars?</i> To be presented at TSD 2008 conference in Brno (http://www.tsdconference.org/tsd2008/).	Research	All	40	ICS-PAS
2008 / 2009	Article: Paola Monachesi et al. "The LT4eL project: results and evaluation": provide an overview of the initial objectives of the project, the results achieved and suggestions for the future.	Research, Industry	All	60	UU
2008 / 2009	Article: Paola Monachesi et. al. "Ontologies and eLearning"	Research, Industry	All	60	UU

2008 / 2009	Article: Eline Westerhout and Paola Monachesi "LT for Dutch eLearning", which will focus on the results obtained for Dutch in the LT4eL project.	Research, Industry	The Netherlands, all	60	UU
2008 / 2009	ILIAS newsletter: ILIAS functionalities will be explained and advertised	Research, Industry, Higher education	All	200	ETHZ
25-27 August 2008	Paper + presentation: Łukasz Kobylński, Adam Przepiórkowski: <i>Definition Extraction with Balanced Random Forests</i> . To be presented at GoTAL 2008 (http://www.cse.chalmers.se/gotal.html).	Research	All	40	ICS-PAS
2008 / 2009	At ZHAW the concept of ontology based search has been integrated in teaching computational linguistics (B.A. Studies in Multilingual Communication)	Higher education	Switzerland	50	ZHW
July 2008	Contacts with Centre for Next Generation Localisation (CNGL): they are interested in using our results for digital content management (especially in using the ontology for multilingual search)	Industry, Research	all	huge	UU
July 2008	Contacts have been established with the Communication Center of the University of Utrecht to assess whether it is possible to have a press release of the LT4eL project in the Dutch media.	eLearning, Higher education, Government	The Netherlands	huge	UU
July 2008	Demo films of functionalities online	General public	All	huge	UU
25 June 2008	Presentation: Paola Monachesi, Lothar Lemnitzer and Kiril Simov: <i>The LT4eL project: final results</i> . To be presented at the LT4LL workshop to be held in Manchester.	Research	Europe	35	UU, UTU, IPP-BAS
From June 2008	ILIAS available via project website	General public, Research	All	huge	ETHZ
June 2008	Latest official release of ILIAS with LT4eL functionalities announced to LMS communities and leading LMS developers (such as Moodle and Olat)	Research, Industry, Higher education	All	50	ETHZ
26 May - 1 June 2008	Flyers: disseminated at LREC 2008 (www.lrec-conf.org/lrec2008)	Research	All	80	Utrecht / all
May 2008	Paper + presentation: Kiril Simov and Petya Osenova: <i>Language Resources and Tools for Ontology-Based Semantic Annotation</i> . Workshop `OntoLex 2008' at LREC 2008.	Research	Morocco, all	40	IPP-BAS
May 2008	Paper + presentation: Dan Cristea and Ionut Pistol: <i>Managing Language Resources and Tools using a Hierarchy of Annotation Schemas</i> . Workshop `Sustainability of Language Resources and Tools for Natural Language Processing' at LREC 2008.	Research	Morocco, all	40	UAIC
May 2008	Paper + presentation: Michael Rosner: <i>ODL: An Object Description Language for Lexical Information</i> . LREC 2008	Research	Morocco, all	40	UOM
May 2008	Paper + presentation: António Branco, Francisco Costa, Filipe Nunes, Pedro Martins, João Silva, Sara Silveira: <i>LX-Service: Web Services of Language Technology for Portuguese</i> . LREC 2008.	Research	Morocco, all	50	FFCUL
May 2008	Paper + presentation: Łukasz Degórski, Michał Marcińczuk and Adam Przepiórkowski: <i>Definition extraction using a sequential combination of baseline grammars and machine learning classifiers</i> . LREC 2008.	Research	Morocco, all	50	ICS-PAS
May 2008	Paper + presentation: Eline Westerhout and Paola Monachesi. <i>Creating glossaries using pattern-based and machine learning techniques</i> . LREC 2008	Research	Morocco, all	50	UU
May 2008	Paper + presentation: Lothar Lemnitzer and Paola Monachesi. <i>Extraction and evaluation of keywords from Learning Objects – a multilingual approach</i> . LREC 2008.	Research	Morocco, all	50	UTU, UU
May 2008	Paper + presentation: Petya Osenova, Kiril Simov and Eelco Mossel: <i>Language Resources for Semantic Document Annotation and Crosslingual Retrieval</i> . LREC 2008.	Research	Morocco, all	50	IPP-BAS, UHH
May 2008	Paper + presentation: Vladislav Kubon and Miroslav Spusta: <i>Multilingual Approach to e-Learning from a Monolingual Perspective</i> . FLAIRS-21.	Research	USA	40	CUP
From April 2008	Contacts with MELT project: interested in multilinguality of LOM instances and KWE (http://info.melt-project.eu/)	Research, eLearning	Europe	30	UU
From April 2008	Contacts with KP-Lab project (http://www.kp-lab.org/)	Research	Europe	25	UU

From April 2008	Contacts with M. Qusay and Jamil Itmazi from Palestinian Admn Area on using results LT4eL to allow easier access to education in Palestinian Admn Areas	Research, Higher education	Palestine	10	UU
From April 2008	Contacts with Razan Khatib and Alma Khasawnih from Questler (http://www.questler.com) on using LT4eL results in eLearning in the Middle East countries.	Research, Higher education	Middle East countries	15	UU
From April 2008	Contacts with Eman Y. Tobail from the Jordan Education Initiative (www.jei.org.jo)	Higher Education, eLearning	Jordan, Middle East countries	20	UU
April 2008	Paper + presentation: Paola Monachesi, Kiril Simov, Eelco Mossel, Petya Osenova and Lothar Lemnitzer: <i>What ontologies can do for eLearning</i> . IMCL 2008.	Research	Jordan	50	UU, IPP-BAS, UHH, UTU
From March 2008	Contacts with Prof. Galal Hassan, chair of the department of Information System at University of Cairo and Prof. Tarek Gharib of the National eLearning center at University of Cairo on collaboration LT4eL project and the eLearning center (http://www.nelc.edu.eg/)	Research, Higher education	Egypt	10	UU
March 2008	Paper + presentation: Paola Monachesi and Eline Westerhout: <i>What can NLP techniques do for eLearning?</i> . INFOS 2008	Research	Egypt	50	UU
From February 2008	Contacts with CNR Rome: in the project Babylon and Ontology (http://www.bonynetwork.eu/) they are interested in the LT4eL semantic search functionality, as well as on the use of ontologies in retrieval of Learning objects. Also, the ontology has been distributed to CNR. In the LTfLL project the collaboration will continue	Research	Europe	30	UU
From January 2008	Contacts with Ontoselect (Paul Buitelaar, DFKI): distribution LT4eL ontology through the ontology library Ontoselect (http://olp.dfki.de/ontoselect)	Research	All	30	UU
January 2008	Project results disseminated by Matthias Kunkel at Learntech conference	Research, Industry, Higher education	All	40	UU
December 2007	Paper + presentation: Lothar Lemnitzer, Kiril Simov, Petya Osenova, Eelco Mossel and Paola Monachesi: <i>Using a domain-ontology and semantic search in an eLearning environment</i> . International Conference on Engineering Education, Instructional Technology, Assessment, and E-learning (CISSE-EIAE 07)	Research	Online conference	25	UTU, IPP-BAS, UHH, UU
December 2007	Paper + presentation: Rosa del Gaudio and Antonio Branco: <i>Automatic Extraction of Definitions in Portuguese: A Rule-Based Approach</i> . TeMa Workshop at EPIA Conference 2007.	Research	Portugal	30	FFCUL
December 2007	Presentation: Lothar Lemnitzer and Paola Monachesi: <i>Evaluating a multi-lingual keyphrase extractor in an eLearning context</i> . CLIN 2007.	Research	The Netherlands	25	UTU, UU
December 2007	Presentation: Eline Westerhout and Paola Monachesi: <i>Semi-automatic glossary creation from learning objects</i> . CLIN 2007.	Research	The Netherlands	25	UU
December 2007	Presentation: Jantine Trapman, Paola Monachesi: <i>Merging LT4eL with the Cornetto Database</i> . CLIN 2007.	Research	The Netherlands	25	UU
From November 2007	ILIAS available via SourceForge.net	Research, Industry	All	huge	ETHZ
From November 2007	ILIAS available via Ohloh.net	Research, Industry	All	huge	ETHZ
November 2007	Paper + presentation: Claudia Borg and Mike Rosner: <i>Language Technologies for an eLearning Scenario</i> . Computer Science Annual Workshop 2007.	Research	Malta	50	UOM
November 2007	Paper + presentation: Claudia Borg, Mike Rosner and Gordon Pace: <i>Towards Automatic Extraction of Definitions</i> . Computer Science Annual Workshop 2007.	Research	Malta	50	UOM
From October 2007	Via the dissemination event, projects have been established with an SME in Malta (Across Limits - Angele Giuliano - partner in Arise project (http://www.arise-project.org/)) in the context of re-use of project results wrt. activities aiming at integration of the Mediterranean Countries through eLearning.	Research, eLearning	Malta, Mediterranean countries	30	UU, UOM
October 2007	Dissemination event during project meeting at Malta	Research, Industry, Higher education, eLearning	Malta	40	UOM

October 2007	Paper + presentation: Adam Przepiórkowski, Łukasz Degórski, Beata Wójtowicz: <i>On the evaluation of Polish definition extraction grammars</i> . LTC 2007.	Research	Poland, Europe	50	ICS-PAS
October 2007	Presentation: Eelco Mossel: <i>Displaying context of search terms for retrieved documents</i> . BIS21++ Information day at RANLP 2007.	Research	Bulgaria, Europe	30	UHH
October 2007	Presentation: Laska Laskova: <i>(Semi)automatic glossary detection for Bulgarian</i> . BIS21++ Information day at RANLP 2007.	Research	Bulgaria, Europe	40	IPP-BAS
From October 2007	Contacts with CNR Rome - Laboratory of Applied Ontology (Aldo Gangemi, Alfio Gliozzo - user panel member) about ontology development, especially with respect to DOLCE, the use of ontologies in eLearning and possibilities for project results exchange.	Research, eLearning	Europe	30	UU
From October 2007	Iryna Gurevich (member of the user panel) provided useful feedback to the LT4eL project especially in the area of semantic knowledge for eLearning and ontology evaluation. We plan to exchange results in the context of her semantic information retrieval project (http://www.ukp.tu-darmstadt.de/projects/sir).	Research	Europe	30	UU
September 2007	Paper + presentation: Kiril Simov, Petya Osenova, Alexander Simov, Anelia Tincheva and Boris Kirilov: <i>A system for semi-automatic ontology annotation</i> . RANLP Workshop 'Computer-Aided Language Processing'.	Research	Europe	30	IPP-BAS
September 2007	Paper + presentation: Kiril Simov and Petya Osenova: <i>Bulgarian language resources for ontology-based semantic search</i> . RANLP Workshop 'A Common Natural Language Processing Paradigm for Balkan Languages'.	Research	Europe	30	IPP-BAS
26 September 2007	Workshop at RANLP 2007	Research	Bulgaria, Europe	50	UU/all
September 2007	Paper + presentation: Dan Cristea, Ionut Pistol & Corina Forascu: <i>ALPE as LT4eL processing chain environment</i> . RANLP Workshop 'Natural Language Processing and Knowledge Representation for eLearning Environments'.	Research	Europe	30	UAIC
September 2007	Paper + presentation: Kiril Simov, Petya Osenova: <i>Applying Ontology-Based Lexicons to the Semantic Annotation of Learning Objects</i> . RANLP Workshop 'Natural Language Processing and Knowledge Representation for eLearning Environments'.	Research	Europe	30	IPP-BAS
September 2007	Paper + presentation: Rosa Del Gaudio, António Branco: <i>Supporting e-learning with automatic glossary extraction: Experiments with Portuguese</i> . RANLP Workshop 'Natural Language Processing and Knowledge Representation for eLearning Environments'.	Research	Europe	30	FFCUL
September 2007	Paper + presentation: Lothar Lemnitzer, Paola Monachesi: <i>Keyword extraction for metadata annotation of Learning Objects</i> . RANLP Workshop 'Natural Language Processing and Knowledge Representation for eLearning Environments'.	Research	Europe	30	UTU, UU
September 2007	Paper + presentation: Eline Westerhout, Paola Monachesi: <i>Combining pattern-based and machine learning methods to detect definitions for eLearning purposes</i> . RANLP Workshop 'Natural Language Processing and Knowledge Representation for eLearning Environments'.	Research	Europe	30	UU
September 2007	Paper + presentation: Eelco Mossel: <i>Crosslingual Ontology-Based Document Retrieval</i> . RANLP Workshop 'Natural Language Processing and Knowledge Representation for eLearning Environments'.	Research	Europe	30	UHH
September 2007	Paper + presentation: Adrian Iftene, Diana Trandabăț, Ionuț Pistol: <i>Grammar-based Automatic Extraction of Definitions and Applications for Romanian</i> . RANLP Workshop 'Natural Language Processing and Knowledge Representation for eLearning Environments'.	Research	Europe	30	UAIC
September 2007	Paper + presentation: Lothar Lemnitzer, Cristina Vertan, Alex Killing, Kiril Simov, Diane Evans, Dan Cristea and Paola Monachesi: <i>Improving the search for learning objects with keywords and ontologies</i> . EC-TEL 2007.	Research	All	50	UTU, UHH, ETHZ, IPP-BAS, OU, UAIC, UU
September 2007	Tutorial: Cristina Vertan: <i>Example-based machine Translation for Cross-lingual Retrieval</i> . MT-summit XI.	Research	Europe	50	UHH

September 2007	Paper + presentation: Cristina Vertan, Paola Monachesi, Kiril Simov, Petya Osenova, Lothar Lemnitzer, Alex Killing and Diane Evans: <i>Crosslingual retrieval in an eLearning environment</i> . At AI*IA 2007	Research	All	50	UHH, UU, IPP-BAS, ETHZ, OU
September 2007	Presentation: Lothar Lemnitzer: <i>LT4EL</i> . Kick-off meeting of the SIG eLearning of the German Society for Computational Linguistics.	Research	Germany	30	UTU
From September 2007	Contacts have been established with Tjerk van Dijk (ProVer) who has been developing a multilingual semantic based search engine for the province Friesland and could benefit from our results.	Industry	The Netherlands	5	UU
From September 2007	Contacts have been established with Giunti Labs (Fabrizio Giorgini) to consider possibility of integrating LT4eL tools in future software	Industry	Italy	20	UU
August 2007	Paper + presentation: Eelco Mossel: <i>Crosslingual Ontology-Based Document Retrieval (Search) in an eLearning Environment</i> . XVIth European Symposium on Language for Special Purposes (LSP).	Research	Europe	50	UHH
August 2007	Paper + presentation: Claudia Borg: <i>Discovering grammar rules for Automatic Extraction of Definitions</i> . Doctoral Consortium at Eurolan Summer School 2007.	Research	Europe	50	UOM
July 23 – August 4 2007	Workshop at EUROLAN 2007	Research	Romania, Europe	50	UU/all
From July 2007	Contacts with AUP in Paris (Claudia Roda, member of the user panel), member of the FP6 AtGentive eLearning project (http://www.atgentive.com/) to assess the possibility to exploit the LT4eL language technology results for determining the attention of learners. In addition, feedback to the LT4eL project has been given especially with respect to validation methodology.	Research, eLearning	Europe	20	UU
28-29 June 2007	Workshop co-located with ACL-07	Research	Czech Republic, Europe	50	UU/all
June 2007	Paper + presentation: Adam Przepiórkowski, Łukasz Degórski, Miroslav Spousta, Kiril Simov, Petya Osenova, Lothar Lemnitzer, Vladislav Kubon and Beata Wójtowicz: <i>Towards the automatic extraction of definitions in Slavic</i> . BSNLP workshop at ACL 2007	Research	All	50	ICS-PAS, CUP, IPP-BAS, UTU
From June 2007	Contacts with CNR Rome - Laboratory of Applied Ontology (Aldo Gangemi, Alfio Gliozzo - user panel member) about the exploitation of semantic knowledge in eLearning, especially wrt. activities aiming at integration of the Mediterranean Countries through eLearning.	eLearning	Europe, Mediterranean Countries	15	UU
From June 2007	UTU joined the newly launched Special Interest Group "NLP and eLearning" under the auspices of the German "Gesellschaft für Linguistische Datenverarbeitung" where they presented LT4eL and its current results.	Research	Germany	30	UTU
From June 2007	Collaboration with Paul Buitelaar (member of the user panel): results have been exchanged between the LT4eL project and the SmartWeb project (http://www.smartweb-projekt.de/) in the area of ontology development.	Research	Europe	30	UU
From June 2007	Established contacts with OU in The Netherlands (Peter van Rosmalen, Jan van Bruggen), coordinator of the TENCompetence (http://www.tencompetence.org/) IP project. The collaboration resulted in a new FP7 STREP project, called Language Technology for LifeLong Learning (LTfLL) in which results of the LT4eL projects will be employed. Three LT4eL partners will participate in the new project, that is UU, UTU and IPP-BAS.	eLearning, Research	Europe	40	UU, UTU, IPP-BAS
9 May 2007	Project web-site: new version of the external portal has been launched. It should give the LT4eL project a refreshingly new and inviting look for everybody who is interested in the project. URL: http://www.lt4el.eu	Research, General public, Higher education, Industry	All	-	UU
From May 2007	Contacts with Aposdle project: exchanging information on the use of ontologies in eLearning (http://www.aposdle.tugraz.at/)	Research	Europe	30	UU
From May 2007	Results have been exchanged and contacts have been reinforced with the FP6 APOSDLE eLearning project (http://www.aposdle.org/) in the area of keyword extraction.	Research	Europe	30	UU
From May 2007	Contacts have been established with the Bazaar project (http://www.bazaar.org/) in order to disseminate the results of the LT4eL project to that community of teachers and trainers.	eLearning	Europe	50	UU

From May 2007	Contacts have been established through Matthias Kunkel with the Share project (http://www.eu-share.org/), that might be interested in the tools developed in the LT4eL project to develop metadata semi-automatically.	Research, eLearning	Europe	40	UU, ETHZ
April 2007	Paper + presentation: Eelco Mossel, Lothar Lemnitzer and Cristina Vertan: <i>Language Technology for eLearning -- a multilingual approach from the German perspective</i> . German Society of Computational Linguistics (GLDV)	Research	Germany	50	UTU, UHH
From March 2007	Contacts with the Open University UK (KMI group) to investigate the use of Semantic Web techniques and tools, especially the ontology search engine Watson (http://watson.kmi.open.ac.uk) to improve the development of domain ontologies.	Research	UK	15	UU
From February 2007	Contacts have been established by Paola Monachesi with Utrecht University ICT center to assess possibility of support development of open sources functionalities and LMS. However, the results are not encouraging due to a blind policy wrt. commercial products.	Higher Education, eLearning	The Netherlands	10	UU
February 2007	Poster presentation: Paola Monachesi, Lothar Lemnitzer and Kiril Simov: <i>Language Technology for eLearning</i> . KP7-congres.	Government	The Netherlands	50	UU, UTU, IPP-BAS
From January 2007	iCamp (http://www.icamp.eu/). The iCamp project is planning to use our corpus of LOs for their research.	Research	Europe	30	UU
January 2007	Paper + presentation: Paola Monachesi and Eline Westerhout: <i>Extraction of Dutch Definitory Contexts for elearning purposes</i> . CLIN 2007 (http://www.ccl.kuleuven.be/CLIN17/)	Research	The Netherlands	50	UU
From December 2006	User panel	Research & eLearning	Europe	10/20	UU/all
2006	Publication: 'Language Technology for eLearning' by Paola Monachesi, Lothar Lemnitzer and Kiril Simov. In 'Proceedings of EC-TEL 2006', Springer LNCS	Research & eLearning	All	50	UU, UTU, IPP-BAS
2006	Publication: 'Integrating Language Technology and Semantic Web techniques in eLearning' by Paola Monachesi et al. In 'Proceedings of ICL 2006'	Research & eLearning	All	50	UU/UHH, UTU, OU, IPP-BAS, ETH, UAIC
2006	Publication: 'Bulgarian Language Technologies in the e-Teaching' by Petya Osenova. In 'Ezik i literatura', vol. 1-2, pp. 172--179	Research & eLearning	Bulgaria	50	IPP-BAS
2006	Publication: 'Requirements-Driven Automatic Configuration of Natural Language Applications' by Dan Cristea, Corina Forascu and Ionut Pistol, In Bernadette Sharp (Ed.): Natural Language Understanding and Cognitive Science	Research	All	50	UAIC
3-4 November 2006	Presentation: Diana Trandabat et al. <i>Romanian Resources in the LT4eL</i> . At "Romanian Linguistic Resources and Instruments for the Romanian Language Processing" (http://consilr.info.uaic.ro/ro/atelier2006/)	research	Romania	20/30	IAIC
3-4 November 2006	Presentation: Ionut Pistol et al., <i>Processing Romanian Resources in the LT4eL project</i> . At "Romanian Linguistic Resources and Instruments for the Romanian Language Processing" (http://consilr.info.uaic.ro/ro/atelier2006/)	research	Romania	20/30	IAIC
25-28 Oct 2006	Paper presentation: Lothar Lemnitzer and Łukasz Degórski: <i>Language Technology for eLearning -- Implementing a Keyword Extractor</i> . Fourth EDEN Research Workshop (http://www.eden-online.org/eden.php?menuId=306)	eLearning	Europe	20/30	UTU, ICS-PAS
12 October 2006	LT4eL dissemination event and project presentation at Charles University	higher education & research	Czech republic	30/40	UU, UHH, UTU, OU, IPP-BAS, ETHZ, UAIC
11 October 2006	ILIAS and LT4eL project presentation at CampusSource Workshop (http://www.campussource.de/events/e0610schlossmuenster/)	eLearning industry	Germany, Europe	50	ETHZ
1-4 October 2006	Poster presentation: Paola Monachesi, Lothar Lemnitzer and Kiril Simov: <i>Language Technology for eLearning</i> . EC-TEL 2006 (http://www.ectel06.org/index.html)	eLearning	Europe	50	UU, UTU, IPP-BAS
October 2006	Contacts with a German network of eLearning developers called Campussource (http://www.campussource.de/org/) were the LT4eL project was presented (http://www.campussource.de/events/e0610schlossmuenster/).	Research, eLearning, Industry	Germany	40	ETHZ

28 September 2006	Paper presentation: Paola Monachesi et al.: <i>Integrating Language Technology and Semantic Web techniques in eLearning</i> . ICL 2006 (http://www.icl-conference.org/)	eLearning	Europe	50	UU/UHH, UTU, OU, IPP-BAS, ETH, UAIC
12 September 2006	Workshop NLP4ME 2006 (http://www.bultreebank.org/NLP4ME2006/)	Research	Bulgaria, Europe	20	UU, UTU, IPP-BAS
12 September 2006	Project presentation at NLP4ME 2006 (http://www.bultreebank.org/NLP4ME2006/)	Research	Bulgaria, Europe	20	UU/UHH, UTU, OU, IPP-BAS, ETHZ, UAIC
13 July 2006	Project presentation at Elsnet Summer School 2006 (http://nats-www.informatik.uni-hamburg.de/ELSNET06/WebHome).	Research	Germany, Europe	50	UHH
24-26 May 2006	Paper presentation: Kiril Simov and Petya Osenova, <i>Shallow Semantic Annotation of Bulgarian</i> . LREC 2006 conference (http://www.lrec-conf.org/lrec2006/)	Research	Europe	50	IPP-PAS
23-27 May 2006	Paper Presentation: Dan Cristea, Corina Forăscu and Ionuț Pistol, <i>Requirements-Driven Automatic Configuration of Natural Language Applications at NLUCS-2006</i> (http://www.iceis.org/workshops/nlucs/nlucs2006-cfp.html) in conjunction with ICEIS 2006	Research	Europe	30/40	UAIC
11-13 May 2006	LT4eL project presentation in the framework of TransTech at the National Research Day - Zurich Universities of Applied Sciences	Research & eLearning	Switzerland	30/40	ZHW
May 2006	Internal seminar of ICS-PAS: Łukasz Degórski, <i>Use of statistical methods for the extraction of keywords in LT4eL project</i> .	Students & Research	Poland	30/40	ICS-PAS
4 May 2006	Public lecture: Kiril Simov and Cristina Vertan, <i>Mapping Multilingual Lexical Material on the Ontology in the LT4eL Project</i> at Hamburg University	Research	Germany	30/40	IPP-BAS, UHH
8 April 2006	Paper Presentation: Kiril Simov and Petya Osenova, <i>Ontology-Based Lexicon and Semantic Annotation</i> at workshop on 'Ontology based modelling in Humanity'	Research	Germany and Europe	30/40	IPP-BAS
From May 2006	With the ELENA project (http://www.elena-project.org/en/) research results on metadata extraction have been exchanged	Research	Europe	10	UU, all
6-8 April 2006	Workshop on 'Ontology based modelling in Humanity' (http://www.c-phil.uni-hamburg.de/view/Main/OntologyWorkshop)	Research	Germany and Europe	30/40	UHH
From February 2006	Partner UHH has contacts with CommSy (http://www.commsy.de/)	eLearning, Higher education	Germany	15	UHH
From January 2006	Some of the I*teach documents (http://i-teach.fmi.uni-sofia.bg/) are part of the LT4eL corpus.	Research	All consortium countries	30	All
From January 2006	Documents from the CALIMERA project (http://www.calimera.org) are part of our corpus.	Research	All consortium countries	30	All
16 December 2005	LT4eL project presentation at CLIN 05 (http://www.science.uva.nl/events/CLIN2005/)	Research	Netherland, Europe	30/40	UU
Since December 2005	LT4eL Project web-site (http://www.lt4el.eu/)	General public	All	Huge	UU/all
From December 2005	PROLEARN (http://www.prolearn-project.org/) tool Flashmeeting (http://flashmeeting.open.ac.uk/) has been used for organizing all LT4eL electronic meetings	Research	All	10	UU
From December 2005	The LT4eL included in official webpage of Romanian Ministry of Research as an on-going FP6 project	Research, Government	Romania	huge	UAIC
From December 2005	ZHW has established contacts with different e-learning centers (e.g. http://elearning.zhwin.ch) and with the CSPC in St Gallen, Chur and Rapperswil (cf. http://www.e-learning.zfh.ch or http://elearningfhf.h-htwchur.ch/).	eLearning	Switzerland	20	ZHW
12 December 2005	Dissemination event and public tutorial on ILIAS in occasion of project kick-off meeting	Research & eLearning	Poland	20	UCO
12 December 2005	Dissemination event and public tutorial on validation in occasion of project kick-off meeting	Research & eLearning	Poland	20	OU
October 2005-February 2006	Virtual Seminar on LT4eL (http://www.sfs.uni-tuebingen.de/~lothar/LT4EL/)	Students & research	Europe	20	UTU
29 September 2005	LT4eL project presentation at CSAW05 (http://www.cs.um.edu.mt/~csaw/CSAW05/)	Research & eLearning	Malta, Europe	20	UOM

4 Publishable results (same as in activity report!)

For each exploitable result, this section indicates:

- Result description (product(s) envisaged, functional description, main advantages, innovations): a short description is provided in the table. Below the table, a more detailed description is given for each of the exploitable results.
- Possible market applications (sectors, type of use ..) or how they might be used in further research (including expected timings)
- Stage of development (laboratory prototype, demonstrator, industrial product...)
- Collaboration sought or offered (manufacturing agreement, financial support or investment, information exchange, training, consultancy, other)
- Collaborator details (type of partner sought and task to be performed)
- Intellectual property rights granted or published
- Contact details

More information on the tools can be also found on the LT4eL web page:

<http://www.lt4el.eu/index.php?content=tools>

Result description (see section 3.1 - 3.6 for description of results)	Possible applications	Stage of development	Collaboration sought or offered	Intellectual property rights granted or published	Contact details
Corpus of Learning Objects	Education, learning systems, distance teaching, eLearning	Prototype/demonstrator available for testing	Information exchange/Training, Available for consultancy	part of the corpus is IPR free	Dan Cristea, dcristea@info.uaic.ro, Paola Monachesi, Utrecht University, paola.monachesi@let.uu.nl
Keyword extractor	Research, Education, learning systems, distance teaching, eLearning	Prototype/demonstrator available for testing	Further research or development support, Laboratory prototype, Information exchange/Training, Available for consultancy	IPR / patent free	Lothar Lemnitzer, University of Tuebingen, lothar@sfs.uni-tuebingen.de, Paola Monachesi, Utrecht University, paola.monachesi@let.uu.nl
Glossary candidate extractor	Research, Education, learning systems, distance teaching, eLearning	Prototype/demonstrator available for testing	Further research or development support, Laboratory prototype, Information exchange/Training, Available for consultancy	IPR / patent free	Lothar Lemnitzer, University of Tuebingen, lothar@sfs.uni-tuebingen.de, Paola Monachesi, Utrecht University, paola.monachesi@let.uu.nl
Ontology & language specific vocabularies	Research & eLearning industry	Prototype/demonstrator available for testing	Further research or development support, Laboratory prototype, Information exchange/Training, Available for consultancy	IPR/patent free	Kiril Simov, Bulgarian Academy of Sciences, kivs@bultreebank.org, Paola Monachesi, Utrecht University, paola.monachesi@let.uu.nl
ILIAS integrated functionalities	Learning systems, distance teaching, eLearning	Prototype/demonstrator available for testing	Laboratory prototype, Information exchange/Training, Available for consultancy	open source software under the GNU General Public License	Alex Killing, Eidgenössische Technische Hochschule Zürich, alex.killing@gmx.de, Paola Monachesi, Utrecht University, paola.monachesi@let.uu.nl
Validation methodology	Learning systems, distance teaching, eLearning	Validation methodology used within the LT4eL project for the validation of the ILIAS LMS with integrated Language Technology functionalities	Information exchange/Training	IPR/patent free	Anne de Roeck, Open University, Milton Keynes, A.Deroeck@open.ac.uk, Paola Monachesi, Utrecht University, paola.monachesi@let.uu.nl

4.1 Corpus of Learning Objects

The LT4eL corpus consists of more than 200,000 words (1,000 pages) of learning objects for each language represented in the consortium. The broad domain of this collection is computing. More specific subdomains include teaching academic skills, creating webpages, basic computer skills. All material has been linguistically annotated at least up to the level of part-of-speech tagging and morphological analysis. Besides, it has been marked up with (i) key words, (ii) definitory contexts and (iii) ontological annotation of concepts.

More information on the LT4eL project can be found at: <http://www.lt4el.eu>.

4.2 Keyword Extractor

To improve the retrieval and accessibility of content through the identification of the learning material by means of descriptive metadata, available language technology tools and resources have been employed within the LT4eL project to develop a keyword extractor that facilitates the semi-automatic generation of metadata. The keyword extractor is a tool that supports authors and content managers in selecting, in the chosen learning objects, the keywords that best represent the topic(s) of these learning objects. The tool analyses a set of annotated documents and returns the best keyword candidates for each learning object. The user of this functionality decides on the inclusion of these candidates into the metadata. The tool has been tested on eight languages (i.e. Bulgarian, Czech, Dutch, English, German, Polish, Portuguese, Romanian) and it can be used stand-alone or within the ILIAS Learning Management System (<http://sourceforge.net/projects/lt4el/>).

The tool has been fully documented. The documentation is essential for a proper integration within each LMS that will be interested in adopting it.

More information on the LT4eL project can be found at: <http://www.lt4el.eu/index.php>. For information on the keyword extractor, check the tools section on the project web page: <http://www.lt4el.eu/index.php?content=tools>.

4.3 Glossary Candidate Detector

Dictionaries constitute an important support to the learning process. One of the assumptions of the LT4eL project is that they can be especially useful if they are constructed on the basis of the definitions extracted from a given learning object. To this end, we have employed available language technology tools and resources to develop a glossary candidate detector.

The glossary candidate detector is a tool that supports authors and content managers in creating glossaries by identifying definitory contexts in a text that contains the term to be defined and its definition. The input of this tool are annotated texts (and background resources). The output of this tool is a set of candidates for definitions that are extracted by means of pattern based grammars. The tool has been developed for eight languages (i.e. Bulgarian, Czech, Dutch, English, German, Polish, Portuguese, Romanian) and it can be used stand-alone or within the ILIAS Learning Management System.

The tool has been fully documented. The documentation is essential not for a proper integration within each LMS that will be interested in adopting it.

More information on the LT4eL project can be found at: <http://www.lt4el.eu/index.php>. For information on the glossary candidate extractor, check the tools section on the project web page: <http://www.lt4el.eu/index.php?content=tools>.

4.4 Ontology & language specific vocabularies

The domain specific ontology on computing is developed in a language independent way and comprises more than 1000 concepts. An English vocabulary is mapped to the concepts and the relations within the ontology. In addition, language specific domain vocabularies have been developed and linked to the ontology for eight languages (Bulgarian, Czech, Dutch, German, Maltese, Polish, Portuguese and

Romanian). The ontology contains 1002 domain concepts, 169 concepts from OntoWordNet and 105 concepts from DOLCE Ultralite. It also contains more than 100 object properties.

The ontology has been used to structure, query and navigate through the learning objects that are part of a Learning Management System. The ontology can play two major roles:

- Classification of learning objects. Each learning object is connected to a set of concepts in the ontology. This classification allows ontological search, i.e. search based on concepts and their interrelations within the ontology.
- Multilingual search for learning objects. In this case the ontology plays the role of Interlingua between the different languages. Thus the user might specify the query in one language and get learning objects in other language(s).

The innovative aspects of the use of the ontology consist firstly in the application of semantic web technologies (ontologies) to facilitate learning processes and, secondly, in their use (linked to language specific vocabularies) to address problems of multilingual nature, in particular multilingual search.

The ontology in combination with the lexica and the learning objects have been used for ontology browsing and semantic search. The software developed to this end has been fully documented. The documentation is essential for a proper integration within each LMS that will be interested in adopting it.

More information on the LT4eL project can be found at: <http://www.lt4el.eu/index.php>. For information on the ontology and the language specific vocabularies, check the tools section on the project web page: <http://www.lt4el.eu/index.php?content=tools>.

4.5 ILIAS integrated functionalities

Within the LT4eL project, three tools have been integrated into the LMS ILIAS (<http://www.ilias.de>):

- keyword extractor;
- glossary candidate detector;
- ontologies for multilingual retrieval.

ILIAS is a web-based learning management system and allows users to create, edit and publish learning and teaching material in an integrated system with a normal web browser. Tools for cooperative working and communication are included as well. ILIAS is available as open source software under the GNU General Public License. The software development worldwide is coordinated by the team at the ETHZ.

The last release (3.5.0) of ILIAS before the project already offered content authors the possibility of annotating learning objects with metadata based on the LOM standard. Also a metadata based search is available. However, the metadata had to be provided manually by the author. This made the annotation process very time consuming and thus only a few authors provide useful metadata. Tools for semi-automatic metadata generation could help to solve this problem. Furthermore, ILIAS does not provide semantic web based functionalities, but it already offers the possibility of reusing learning objects like media objects or glossary items in the creation process of learning material. Ontology based retrieval of learning objects will considerably improve the task of reusing learning objects since ontologies will allow for intelligent searching and navigation in huge amounts of data. Metadata annotation and ontology driven search and navigation allow for individual content assemblance for learners. Learners will be able to build individual learning paths by entering key terms of concepts they need to learn.

ILIAS with integrated LT4eL functionalities and documentation, can be downloaded from SourceForge: <http://sourceforge.net/projects/lt4el/>.

More information on the LT4eL project can be found at: <http://www.lt4el.eu/index.php>. For additional information on ILIAS with integrated LT4eL functionalities, check the tools section on the project web page: <http://www.lt4el.eu/index.php?content=tools>.

4.6 Validation methodology

As part of the LT4eL project, a suitable validation methodology has been developed and applied to the

validation of the functionalities developed within the project as well as to their integrated set into ILIAS. Within the LT4eL project, the following three tools have been integrated into the LMS ILIAS (<http://www.ilias.de>):

- keyword extractor;
- glossary candidate detector;
- ontologies for multilingual retrieval.

eLearning applications are very much an emerging field, and there are no standard, general methodologies that can be used to validate effectiveness of the learning process in our specific context. The methodology developed within the LT4eL project can be at least a first step towards this missing standard.

More information on the LT4eL project can be found at: <http://www.lt4el.eu/index.php>. For additional information on the validation methodology, check the tools section on the project web page: <http://www.lt4el.eu/index.php?content=tools>.