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Babylon & ONtology: Multilingual and cognitive e-Learning Management System via PDA phone

Progress Report Public Part

Project information

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Executive Summary

BONy **Target audience** is composed by all professionals, students and researchers which are already or potentially involved and interested in EU cooperation programme in the fields of lifelong education, research and development, and technology innovation. In special, we are targeting the following audience in order to assess and disseminate project output: Scientist researcher, PhD students, School and University teachers, Project Manager, Enterprise managers and employees, International Cooperation executives, people in mobility thanks to Leonardo da Vinci (Vocational education), Grundtvig (Adult Education), 7FP(R&D) programmes. All these professional can be also in "Mobility" thanks to EU common labour market and profit of BONy "Mobile" services.

Project objectives are modelled on the base of BONy target audience needs and LLP aims: i) supply the labour market needs with the realization of an "intelligent and multimedia e-courses" on Project Cycle Management in the following languages: English, Italian, Greek, French, Spanish, Catalan, Polish, German, Hungarian, Slovakian, Czech; ii) enhance foreign languages acquisition in combination to vocational training with the support of multilingual semantic technologies to stimulate the promotion of linguistic diversity; iii) improve training accessibility and mobility, thanks to PDA phone interface, integrating e-learning vocational training into professional activities; iv) promotion of an innovative European Educational Social Network in order to stimulate the cooperation among different skills and abilities in the multilingual environment; v) promote knowledge sharing among different cultures, allowing multiuse and collaborative enrichment of the training materials. Technically these objectives can be reached by harmonizing existent technology form a broad range of scientific areas. Therefore this project encourage the technology transfer from academic research to the SMEs involved in the project.

Participants involved have a consolidated background and know-how in "classical" e-learning technology and quality assessment in education, that they plan to enrich with the innovative insight that will be provided by the centre of excellence in Semantic Technology research. In particular: ontological representation of contents, semantic web based approach for knowledge sharing allowing the collaborative creation and maintenance of multilingual educational contents.

The **approach used** is the Social Network (SN) analysis, finalized to assess the reputation of players or tools, being them students, professors or Learning Objects. In particular, this analysis will suggest each user a suitable training partner from the established network, reducing the overall cost of professional teachers and educational items. Semantic technology as well as statistical analysis of the behaviour of players in the network is done to this aim. Questionnaires are also used to know users' perception of BONy services.

Major results achieved to date are: set up of BONy learning 2.0 management system, creation of the English version of the multimedia course on PCM and its assessment by an international user test-group.
Next steps: to up-date the e-course accordingly with test results and users suggestions, translate the course in the other ten languages, integration of the core ontology describing the knowledge in 11-languages, implementation and integration of the intelligent tools and the Social Network infrastructure.

Project deliverables, news and dissemination events are available form **project website**: www.bonynetwork.eu

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1. Project Objectives

BONy… "is a new and fresh idea[1]".

The evolution of the traditional web into the WEB 2.0, where connections among peoples are established as well as connections among information objects, has given a strong input to the development of eLearning technologies, suggesting a roadmap to collaborative learning. This is the objective of the BONy project.

BONy wish to be a cognitive e-Learning Management System (LMS) allowing users to find and learn the units strictly requested and strictly necessary to achieve their training experience. BONy intend to supply a multilingual access to information. This involves an ontological representation of knowledge and an interconnection among learning objects accordingly to Semantic WEB methodology, best practices and standards. Users will be able to retrieve such educational contents and interact with learning partners using a PDA phone, in order to produce the first in-site intelligent e-learning system which will change user's perspective on learning.

With the aim to respond to our target users' needs we want to reach the following ambitious objectives:

(i) an 11 languages **e-course** on Project Cycle Management (P.C.M.) and European Grant management, because project management and European cooperation are professional realities. Project cycle management and linguistic knowledge are fundamental aspects of personal abilities. These skills are strategic for SMEs employees, Universities and research institutes managers and researchers.
The involved languages are: Italian, English, Spanish, Greek, German and French from west Europe; Polish, Hungarian, Slovakian and Czech from east Europe; Catalan as example of minority language. First, Learning Objects are created using the SCORM international standard. This "pilot" course is available in English language for a first assessment before translating. In fact, a first test happened in December 2008. Aim of this test is to assess exhaustiveness and clearness of educational contents and multimedia graphic interface. Then, after modification and up-dating, following the test-group feedback and suggestions, the eCourse is going to be translated in the other ten languages.

(ii) an **Ontology**-based description of knowledge. This aim at re-engineering SCORM-based information (learning objects) in a different standards of knowledge representation using the Ontology Web Language (OWL). **What is an Ontology?** In Artificial Intelligent (A.I.) literacy, this word "ontology" have a different connotation than in the philosophic one, where an Ontology is a theory about the nature of the existence, a "systematic account of Existence". In A.I. and related computational linguistic studies, what "exists" is that which can be represented. Here an ontology is a document that contains concepts and relationships used to describe and to represent an area of knowledge. Ontologies are used to classify the terms used in a particular application, to characterize possible relationships, and to define possible constraints on using those relationships. In particular, ontologies fulfil the need to specify descriptions for the following kinds of concepts:

- Classes (general things) in the many domains of interest;
- Relationship that can exist among things;
- Properties (or attributes) those things may have;

[1] Extract of the BONy evaluation report - 135263-IT-MP, §2, p.1.

- Additional constraints on classes, relationships and properties.

Pragmatically, an Ontology is a collection of words links together following a specific description logic. An Ontology is composed by a T-box and an A-box. In description logic used in Computer Science, the T-box contains the axioms defining the classes and relations in an ontology, while the A-box contains the statements about individuals and/or objects in the domain of interest: a T-box is a "terminological component" , a vocabulary associated with a set of facts A-box. Together A-box and T-box statements make up a knowledge base.
Therefore, ontologies express their real power when they are published and exchanged between different communities. In fact, an ontology represents knowledge in a language independent way. It can be used to increase the accuracy of Web searches. In summary, by performing automated reasoning on ontologies, it is possible to provide advanced services to intelligent applications such as: conceptual/semantic search and retrieval, decision support, speech and natural language understanding, knowledge management, intelligent databases, and so on. This knowledge structure is readable by machines and software agents, so it is essential to reach other project aims, such as multilingualism management, user-based educational pathway customization, semantic information retrieval.

(iii) an adaptive and **intuitive e-learning system** able to learn and configure itself according to it's “understanding” and interaction with learners' behaviour. An adaptive e-learning system is supposed to adapt and personalize e-learning content, pedagogical models, and interactions between participants so as to meet the individual needs and preferences of the users. In order to do so, a user profile and a user model should be available. A **user profile** is a collection of personal information about a user. The information is stored without adding further description or interpreting this information. User profiles represent cognitive skills, intellectual abilities, intentions, learning styles, preferences and interactions with the system. Thus, user profiling is simply seen as the process of collecting raw data about the user. On the basis of the information stored in the user profile, a user can be modeled. A **user model** stores semantically enriched information about the user. For example, a user model provides information about the user’s learning styles, educational curriculum, history of interactions with the system and the domain knowledge. A user model represents the system’s beliefs about the user. In general, the **adaptation process** can be described by three stages: retrieving the information about the user (user profiling), processing the information to initialize and update a user model, and using the user model to provide the adaptation (N. Koch, 2000; C. Froschl, 2005).
More educational e-contents are becoming available on-line, the need for systems capable of automatically constructing personalized curricula by organizing learning objects has become more intense. Planning technologies can be combined with Semantic Web technologies to obtain systems for automatically synthesizing curricula. The use of planning techniques allows the system to dynamically construct learning paths even from disjoint learning objects, meeting the learner’s profile, preferences, needs and abilities (Kontopoulos, Vrakas, Kokkoras, Bassiliades, Vlahavas, 2008).
In our European frenetic working scenario “learners” are often very busy researchers or corporates’ managers, with different backgrounds and learning attitudes, and with limited time available. From our point of view, training-personalization and time-saving are the keystones for effectiveness and attractiveness of each e-learning methodologies.

(iv) a **semantic search engine** prototype. A key point about the retrieval and the storage of the e-learning information (that is, the LOs) regards the way in which this strategic step is performed. The traditional approach performed by Information Retrieval (IR) systems is keyword based. That is, for a given query, a list of documents/resources, ordered by relevance, is returned. Relevance computation is primarily driven by a basic string-matching operation. This means that the traditional IR systems are based almost purely on the occurrence of words in documents/metadata. This approach is performed without any reasoning mechanisms able to take into account the meaning (the semantic) of the sentence

expressed by the user. In a more extended context (the general web) this aspect highlights the importance to have a mechanism by which to obtain more sensate answers from a specified query. In other words, the semantic search attempts to augment and to improve traditional search results by using a particular kind of data. In our context (e-learning, but this concept is generally true also on WWW) this particular data is the ontological representation of the semantically enriched SCORM metadata. The semantic search can be employed to retrieve information by using synonymous of keywords or independently by the query language (cross-language research).

(v) a trainee/trainer **social network** acting as "bank of time" helpful to create a "friends of a friends" communities of experts aiming at achieve a further linguistic integration, an interdisciplinary collaboration and an inter-cultural dialogue. Users get in to interact in the S.N. assuming the double role of trainees/trainers on the base of knowledge (professional and linguistic skills) they wish to share with the community. Trainees/trainers professional skills will be adequately valorized and included in the lifecycle of the learning process, unloosing precious human and economic resources thanks to a "Reputational system". This is a Social Network diffused approach to rate user's contribution to educational activities (in terms of educational contents added or tutorial actions provided). A "Recommending system" suggest lessons and learning partners on the basis of the user profile and their learning requirements. The system will automatically suggest, for each topic, the other users in the community that have been judged able to teach or assist other students. To this aim, the system will exploit the user profile automatically inferred by means of the cognitive technologies. Thus, that makes the object of our evaluation: Social Network makes collaborative e-learning more interesting and efficient?

(vi) a **mobile phone adapter** system able to summarise intelligently the required units and send smart modules to a PDA phone, allowing more personalization of the training process in term of place and time. The BONy philosophy is that learning is an aspects of concrete professional life. Therefore the lifelong learning process cannot be separated from all other daily activities. European mobility, business travel and international meeting, are a day-by-day reality. Thanks to a PDA-client, users are able to access the knowledge contained in BONy, retrieve required information and get in contact with other user on using a common internet IP protocol. Advanced PDA can also support BONy video-call and video-conference system. Consequently, people can train easily everywhere, optimizing their quality time in educational activities.

How BONy is going to benefits its users ?

> *"It use the most innovative tools to achieve its aims in a way that doesn't "over technologize" its users, since most of its advanced features – the use of artificial intelligence – will remain an hidden structure behind the operating system that the users themselves will never see but still benefit from"*[2].

First of all, it is important to introduce BONy **target group,** which is composed by:

- the growing number of European undergraduate or graduate trainees moving through Europe for a professional experience involving the project cycle management, thanks to EU programmes like *Leonardo da Vinci* or *Erasmus for young Entrepreneurs*;
- the increasing number of scientists, researchers or company managers and employees, engaged with the numerous European cooperation programmes, such as the LLP, 7FP, CIP and so on.;

[2] Extract of the BONy evaluation report - 135263-IT-MP, §2, p.1.

- unemployed or career-changers aiming at reaching new work opportunities by improving personal curricula.

BONy's **beneficiaries** come from the academic, scientific and industrial European society in is complex composition. BONy mission is to improve the e-educational quality, to test a Social Network approach to on-line education involving an user reputational system, in order to test the quality and efficiency of this collaborative approach. In these terms, BONy will contribute to the improvement of the European educational quality standard.
The European society involved in scientific and educational issues and people passionate by the European-level cooperation implying project management, will benefit from a high quality educational instrument and an interdisciplinary experts social forum. Consequently, European SMEs, Universities and Research institutes will be more competitive in term of know-how transfer in the international scenario.
Additionally, the consortium is going to promote BONy's e-course giving the opportunity to people involved in any European projects to make free use of it during one year after the project lifetime.

A **Use-case** example can give a clear explanation of BONy utility for targeted users.
We can easily imagine a polish trainee moving to Catalonia in a Catalan speaking enterprise for a training experience as a project manager assistant, thanks to a Leonardo da Vinci programme. He is given a PDA system implementing the BONy's system. At the configuration phase, he will express his formative needs by compiling a short questionnaire regarding his curriculum and interest for particular aspects of project cycle management. Once the system has identified trainee's knowledge level, BONy automatically calculate and suggest an appropriate training path consisting on a sequence of lessons in the desired language (multilingual access). After each lesson, BONy's virtual tutor will automatically generate appropriate multi-answer tests based on consulted units. BONy will track the user behaviour, identifying its interests and monitoring the improvements by identifying the sub portions of the ontology that have not been explored yet, and eventually propose additional material to fill trainee's gaps. In addition to this, our polish trainer can ask for human supervision regarding specific topics (professional or linguistic) among a group of BONy's Social Networks members, selected from the system on the basis of their assessed knowledge about the requested subject. In this collaborative scenario, each member as a double role of student and professor. In addition, from the combined analysis of the behaviours of the community members, the BONy recommending system, by following a "friend of a friend" approach, propose to a specific trainee to follow the same path as the most similar trainee did. The multilingual representation of knowledge ensured by the ontology will also allow the trainee to switch language (e.g. from Polish to Catalan) in both the learning and the test phases. In the middle of a presentation with project partners, the trainee could ask the system for additional information about a specific concept. BONy semantic search engine, based on the Ontology, will retrieve the requested info in a user dependent way, and it will provide it in-site by a PDA-client.

BONy should be intended as a day-by-day learning tool, following managers, trainers and researchers during daily tasks, news challenges and continuous professional and linguistic skills up-dating. It is an instrument to collaborate, be involved and to get in an international R&D community by the main door. BONy is a knowledge shared environment where talking about scientific R&D topics, is an instrument to find new partner with which join force to implement new R&D project, is a course about how to get and manage grants for R&D initiatives.

Economical benefits are also envisaged for BONy community members. Collaborative technologies for content development will reduce educational contents production costs, maintaining an high quality standards. In order to develop an e-learning course, the highest expenses are in general due to the production of didactic material (such as scripts, story-

boards, animated lessons) and subsequent up-dating. The BONy's philosophy is to minimize the amount of pre-defined didactic material, while representing it at an ontological level allowing knowledge sharing. In this way, users will be able to augment the amount of didactic material by proposing their own documents and connecting them to the ontology, following a collaborative writing schema largely adopted in encyclopaedic experiences such as *WIKIpedia.* The BONy proposal of creating an education-dedicated Social Network, allowing students to interact between each others, reduce also the costs required for human supervision. This approach will reduce the cost of access to the e-education, while maintaining an high level of quality thanks to the community-based reputational system.

Two BONy **test events** are planned to directly involve end-users. The first one in December 2008, in order to assess the exhaustiveness and the clearness of course contents – English pilot version (more details about results are provided in the next chapter); the second one in December 2009, in order to test the whole BONy architecture and the eleven languages e-course version. Then, a final workshop is planned at the end of the project life-time in order to show BONy utilities to future users. These test-events are a precious opportunity to evaluate the quality of educational contents and ICT tools, but also they are strategic to contact and involve the first users and components of BONy Social Network. On-line dissemination activities like web-site information up-dating, Social Network groups, newsletters and articles to e-magazine have also an important role.
Further activities carried out to involve end-users, such as conferences and seminaries, are presented in chapter 2.

The first **impact** of BONy project will be manifested on the e-learning sector through the dissemination and diffusion of expected technological enhancement. The introduction of Semantic WEB service for multilingualism management, the utilization of Ontologies for knowledge representation and the re-organisation of learning methodology through social network, is going to change the *"vertical"* perspective of e-learning:

teacher
↓
given contents
↓
students

to the *"horizontal"* one:

teachers ↔ networked contents ↔ students

Why this revolution can be successful? Because the collaborative approach reduce the cost of educational contents production and the cost of human tutoring supervision.
The collaborative model makes e-learning accessible and users feel themselves such active players of the educational-cultural process.
We believe that the e-learning service providers will innovate their production process undertaking the way of Semantics and Ontology.
Secondly, we think that if it is truth that "time is money", personalization of educational pathway and mobility-learning via PDA phone makes e-learning more suitable, less time consuming and nearest to the idea of adult lifelong learning.
Thirdly, BONy project is supplying a labour market need with the realization of a Project Cycle Management e-course. The impact of BONy project will be noticeable on the sector of companies and organisation working in European projects as like as the educational sector.

2. Project Approach

"This project address the European Value quite elegantly by offering an equal status to smaller language groups…the introduction of the social aspect of this project, that each user becomes part of a pool of trainers and the trained simultaneously, is a rather strong aspect and one that feeds the idea of a cross-cultural meeting of minds and collaboration across borders. This is a truly European project" [3].

There are not clearer words to express the added value bring by BONy to the European community, form a pedagogical and political point of view. Lets see it deeply.

As mentioned in the previous paragraph BONy approach is an collaborative horizontal approach, where educational content are not given but networked.

The **pedagogical approach** will be based on three didactic pillars: (i) e-learning strategy; (ii) European project management's rules and users requirements; (iii) Artificial intelligence and learners/tutors e-community:

- the eleven languages e-course is under development following a consolidated e-learning procedures. That implies the definition of an *ad hoc* e-learning strategy in terms of target group's needs, target group's technologies empathy, course's objectives and useful technologies. The whole course organisation, in term of graphic interface, user assistance, employed medias, personalized procedures depend on the e-learning strategy. Our didactic e-learning strategy is mainly based on user's profiling and training personalization, simple multimedia interface and high quality of contents, good user empathy with networking ICT tools (e.g. wikis, forum, chat, videoconference) and PDA phone;

- the e-course is developed following the European literature on project cycle management, the European R&D programmes policies and rules. This course is created to attract the critical mass of users necessary to test BONy's networking tools. The aim is to let users enriching and up-dating the starting educational support by using *Semantic WIKI Media*.

- the traditional "one to many" tutoring activity will be substitute by:
  - ✓ a virtual tutoring system, a fully automatic intelligent system able to plan and recommend learning path thanks to users ponder over of keywords and arguments;
  - ✓ a social network able to realise a cross-expertises "many to many" tutoring environment, able to assist users during their information hunting or training path configuration.

The two tests involving end-users are an important part of the approach, in order to assess the clearness and exhaustiveness of the didactic materials, to verify the usefulness and attractiveness of the social network approach, to collect data for future updates and researches.

The **added value** that BONy projects brings to the European Lifelong learning community can be easily summarised through the following points:

- BONy represents an original effort to establish a link among present and future European project managers with different background, working for different association

[3] Extract of the BONy evaluation report - 135263-IT-MP, §4, p.1.

(Universities. Research institutes, SMEs) or in mobility through Europe thanks to one of several European cooperation programmes;

- The trainee/trainer Social Network is a useful collaborative atmosphere able to create a "friends-of-friends" European expert community, where people can interact and exchange expertise, ideas, advices. A Social network can suggest specific issues and became a powerful European brain-storming environment, without geographical barriers. It will exponentially implement the European's capacity of know-how transfer.
- The project will offer the necessary channels for the easy and direct communication and allow the exchange of point of views among trainers, satisfying the European lifelong vocational learning demand;
- BONy social network aims at collecting information related to the common project cycle management core, but also information about European research objectives and innovation policy; Bony wishes to be a European scientific forum;
- Project cycle management and linguistic skills will make European project managers more competent. Consequently European SMEs, Universities and Research institutes will be more competitive in an international scenario; furthermore, the e-course usable in Polish, Hungarian, Slovakian and Czech will stimulate the participation of new actors from eastern member states to the European cooperation programmes.
- The experience gained by BONy project on cognitive prototype system can be combined with the results of other EU projects (i.e. 7FP ICT 2007 Work Programme, chapters 2 and 4: Objective ICT-2007.2.1 Cognitive Systems, Interaction, Robotics and Objective ICT-2007.4.1 Digital libraries and enhanced-learning) for the development of an overall strategy that can be used towards the creation of a common European intelligent and cognitive educational system;

The **evaluation strategy** of BONy educational tools can be summarised in three main points, as follow:

1. **Assessment of users' needs on Project Cycle management (focus on literature)**
    a. Users' needs analysis is normally adopted to identify the required educational content. In order to indentify contents on project management, The consortium did not enquire potential users directly by the submission of questionnaires. We adopted a State of Art approach based on European literature survey to select useful educational contents for BONy e-course redaction, challenging their quality and exhaustiveness;

2. **Assessment of the e-course contents (focusing users feedback on content)**
    a. Users expectative estimation - questionnaire submitted to the test group before the BONy test in order to assess how and what user aspect to learn from an e-learning experience;
    b. Feedback from users - questionnaire submitted after BONy test in order to know what users think about clearness, usefulness and exhaustiveness of contents and graphic interface;

3. **Assessment of ICT tools impact on quality improvement (focusing users feedback on ICT tools)**
    a. comparison between two test experiences:
        1. *First pilot test* - December 2008 - assessment of contents using State of Arts e-learning tools (standard LMS), by:
            I. comparison between entry test versus final test score (statistics),
            II. percentage of users that finish the course (statistics),
            III. User feedback on usefulness of the standard course and educational pathway (questionnaire),
            IV. User feedback on contents exhaustiveness (questionnaire),
            V. User feedback on graphics and users-friendliness (questionnaire),

2. *Second pilot test* - November 2009 - assessment of social network and semantic tools impact on quality of learning.

First pilot test outputs are presented in paragraph 3. Second pilot test framework is presented in paragraph 5.

Dissemination and exploitation strategy and activities.

Has showed in the dissemination and exploitation plan, the consortium is swotting up the better ways to reach our target group. A specific "user needs" reports has been produced. The consortium will reach our targets through the channels and tools that are more appropriate for the adult education providers associations, association of industrials, universities, consultancies, company training departments, human resources departments, professionals associations, research centres and associations of professors specialising in European integration.

In order to reach the users needs, BONy Consortium is:

- up-dating a database about our potential users, send them information by e-mail, post, etc so that they can give us their opinions about our project;
- making BONy project more popular and renown distributing leaflets and attaching posters at thematic conference, sending brochures to local institutions, governments and asking them for help, advertising campaign;
- publishing an user-friendly quiz on European cooperation topics in order to stimulate the curiosity of visitors;

Next year, the BONy Consortium is going to:

- create an online questionnaire where people can express their opinions and evaluate the project in terms of innovation, usability, usefulness, etc.;
- involve people of high expertise in the pilot testing in order to gain better feedback;
- to create a users profile database' in order to store details concerning their contributions in relation to what group they come from (i.e.: *this age group says this…; this professional group needs such expertise…; this nationality has such attitude towards learning, etc.).* This will lead to a comparative perspective on users and needs on which to develop BONy as an educational/professional networking service and as an up-skilling tool, while creating the appropriate approach for each learners' group.

The channels and tools planed to involve target audience are in brief the following:

- **channels**: training association, training corporate, association of industrials, network of excellence, specialized magazine, internet, Social Networks and e-journals, thematic international conference.
- **tools**: product demonstration, seminaries and workshops, web site, project posters and leaflets, success story, press-note, newsletters.

The consortium adopted an **innovative on-line dissemination strategy** based on the existing Social Networks to publicize BONy initiatives. BONy plan to be an European Social Network on European Project Management, but also on Education and collaborative learning. The main trouble here is to reach a critical mass of users necessary to start-up a Social Network and test collaborative ICT tools. The most representative example is the opening of the **BONy Group** on *Facebook*[4] and *LinkedIn*[5], on November 2008.

[4] http://www.facebook.com/group.php?gid=49199360730
[5] http://www.linkedin.com/groups?about=&gid=1280247&trk=anet_ug_grppro

The interesting aspect is that we are addressing a public composed by users which already are confident with Social Network interaction and knowledge sharing.
In a month, 163 users join these two BONy groups. BONy website visits increased by 40%. Through these groups, we also organised a BONy event the "BONy Pilot Test" [6], explaining modality and aims of the test. Easily we invited selected users (in accordance to our short-term target group) to attend the BONy e-course pilot test, reaching a number of 50 additional test users.

Other two web-events helped us joining our target group audience. First, the elearningeuropa.info gateway, in its newsletter of November, presented BONY as "Project of the Month", underlining innovation which BONy brings in the field of e-learning, through the Semantic WEB and Social Network approach to the collaborative learning[7]. Second, another web-magazine, €conomiasicilia, presented BONy aims giving echo to elearningeuropa.info's newsletter[8].

Concerning the **off-line dissemination**, at present, BONy got the attention of University students, PhD, experts professionals, scientists and researchers at the following **events**:

- Sixth International conference on Language Resources and Evaluation, LREC 2008, Marrakesh, Morocco;
- Conference on Intelligent System - knowledge and technology transfer, 2008, Olsztyn, Poland;
- Online Educa Berlin 2008, the largest global e-learning conference for the corporate, education and public service sectors, Berlin, Germany.
- Sixteenth International Conference on Knowledge Engineering and Knowledge Management, Knowledge Patterns, EKAW 2008, Catania, Italy; This event was attended by the following key persons:
  - Ricardo Baeza-Yates, Vice-President of Research for EMEA & LatAm Web at ***Yahoo! Research*** Barcelona,
  - Conor Shankey, Chief Technology Officer at ***Reinvent Technology Inc.*** Vancouver, BC, Canada,
  - Jose Manuel Gómez-Pérez, Research Manager at Intelligent Software Components, ***iSOCO***, Madrid, Spain,
  - Peter Clark, Research Scientist at ***Boeing*** *Research and Technology,* Seattle, Washington.
  - Filippo Fabbrocini, Business Development Executive at the ***IBM,*** Rome, Italy
  - Jérôme Euzenat, Chef researcher at ***INRIA*** *Rhône-Alpes & LIG*, Montbonnot, France,
  - Wolfgang Maass, professor of media computer science at the ***Hochschule Furtwangen University*** , Furtwangen, Germany.

The University world is also reached by organising seminaries on knowledge management, where interested students can know the opportunity of e-learning and semantic technology and also reach useful university formative credits. An example can be the BONy and e-learning methodologies seminary organised at the Faculty of Engineering, University of Messina. This conference (audio/video and PowerPoint presentations) was streamed on the web through PMF's web-seminar platform, in order to reach a larger numbers of peoples.

Furthermore, during BONy development, the consortium is reinforcing and augmenting the **contacts and collaboration agreements** with universities, public bodies, SMEs and

[6] http://www.facebook.com/event.php?eid=33241389834
[7] http://www.elearningeuropa.info/newsletter/index.php?lng=en&page=home&nws=59&service=4&max=12
[8] http://www.economiasicilia.it/?nw=1&idp=463

research institutes with the aim to identify and group the target-test audience and Social Network communities. A cooperation agreement has been signed with the Italian National Council of Research.

Sustainability after the funding period. BONy will provide a free access to all project manager involved with an EC funded project, and to all users which have participated to the two pilot tests, during one year after the end of the funding period (2010). Otherwise the consortium intend to sell access-code to BONy e-course and social network.
Other incomes are expected by private advertisement on the Social Network, consulting activities about Social Network and Semantic WEB technologies for collaborative e-learning scenario (WEB 3.0), commercialization of “Plug-in” to integrate automatically Semantic technologies applications into open-source LMS and Social Network platforms.

3. Project Outcomes & Results

In accordance to the work plan, BONy objectives for 2008, the following tasks have been achieved:

WP1. *Set up of ICT platforms for project management*. In order to manage the work plan and coordinate the international partnership efficiently, the usage of three important ICT tools has been suggested and adopted by the coordinator[9]:

1- *MVCS[10]:* it is a web-based many-to-many videoconference platform, useful to organise on-line meetings. The coordinator uses to schedule a consortium meeting monthly in order to verify the enhancement of the work plan and pinpoint the next steps. Partners use to report to the coordinators their achievements. Problems and solutions are also discussed during these virtual meetings.
2- *dot.Project[11]:* it is a web-based project management software. All BONy WPs and tasks are charged and described on this collaborative platform. The coordinator is able to assign tasks to the partners and to monitor tasks enhancements, timing and workloads.
3- *BONyWiki[12]:* it is a web-based and collaborative environment used by the consortium for knowledge sharing and editing, following the Wikipedia approach. Partners are using this wiki-media to draft deliverables in a collaborative way, give suggestions or highlight literacy references. In a few words, the consortium is experimenting on itself the collaborative tool, which BONy Network wishes to offer to its user-group.

WP2. *Realization of the e-course on Project Cycle Management in the SCORM standard*. The consortium produced an accurate State of Art report on Project Cycle Management (Deliverable 2.1[13]), integrating procedures explained in Project Management literature[14], EU specifications (such as European programme aims, funding schemes, administrative and financial rules), and consortium members experiences and consolidated best-practices.
After that, the consortium produced the course's "*script"* in English, then the *"instructional design"* and *"Story board",* and finally, the e-course using the international SCORM standard. This "pilot course" was tested during the first week of December 2008 (more info on WP5).

WP3. *Production of the State of Art on Intelligent and Semantic technology useful for BONy use-case*. The R&D partner accomplished the first "knowledge and Technology transfer" phase, producing an accurate State of Art (deliverable 3.1[15]) on Semantic WEB and Artificial Intelligent technologies for e-learning scenario. Day-by-day contacts and bilateral meetings between P.M.F. and CNR staff also helped the involved partners in seeing out this task.

WP4. *Partners technology surveys (deliverable 4.1[16]) and set up of the BONy LMS including collaborative learning tools*[17]:

- Installation and configuration of dedicate Linux server, hosting the BONy LMS platform,
- Installation and configuration of BONy LMS platform,
- Graphic customization of BONy LMS platform

[9] http://www.bonynetwork.eu/index.php?option=com_content&task=view&id=19&Itemid=42&lang=english
[10] http://www.bonynetwork.eu/mvcs/index.php
[11] http://www.bonynetwork.eu/dotproject/
[12] http://www.bonynetwork.eu/wiki/index.php/Main_Page
[13] http://www.bonynetwork.eu/download/deliverables/D2.1.pdf
[14] Bibliography in Section 7 – Extra Heading.
[15] http://www.bonynetwork.eu/download/deliverables/D3.1.pdf
[16] http://www.bonynetwork.eu/download/deliverables/D4.1.pdf
[17] http://social.bonynetwork.eu/

- Integration of *MediaWiki* and creation of wiki-based course structure on PCM[18],
- Integration of the English version of the e-course on PCM in SCORM standard,
- Integration of four different survey tests in SCORM standard,
- Integration of *MVCS* Video conference system[19],
- Debugging of all current tools.

WP5. *First Pilot Test output evaluation*. Partners dissemination activity of BONy first pilot test allowed the consortium to reach the sufficient number of users required to validate test results: 120 users. It is important to highlights the massive contribution - in term of managers, teachers and students participating at the test - of the following organisations:

- Modena Municipality, Office for International cooperation (Italy), in charge of the vocational course on voluntaries for international cooperation[20].
- Koszalin University of Technology, Industrial Design Department (Poland), in charge of the scientific degree of doctor in technical sciences in the area of machine building and exploitation.

The pilot test was structured as follow:

1. a preliminary survey on user's expectation on PCM and e-learning methodology,
2. en entry test composed by 15 questions on PCM general knowledge,
3. execution of the course on PCM, subdivided in five sections,
4. a final test in order to assess user's acquired skills on PCM,
5. a concluding survey on user's experience and feelings.

In total, 120 users, coming from 14 different countries, registered them-selves at the BONy platform, but only 115 of them took part in the test actively. Test audience was composed by university, post graduated and PhD students, researchers on ICT and education, enterprises managers and employees, vocational training services providers, staff of the Italian Ministry of Education.

Concerning the first survey on user expectation (point 1 – survey copy in "extra heading" section), composed by five questions, 91% of users define the course topic as very interesting and useful for their career and personal curricula improvement. The remaining 9% define the course's topic as interesting but not crucial for their own professional pathway. 85% of users declared to be interested in experimenting innovative learning material (theory, exercises and pedagogy), but only 40% define them-selves as confident with e-learning technology. These data suggest us that we reached the desired target audience disseminating properly project aims and this first test events.

At the entry test (point 2), users' average percentage of PCM knowledge was 23%. At the final test (point 4) the average score grown up to 67%. This positive ∂ (difference between entry test score and final test score) of 44% can give us a partial indication about the quality and the clearness of contents and the effectiveness of the learning process.

Only 37% of all participants completed the standard (not-personalised) educational pathway composed by 108 animated slides, consultable in an estimated time of 8 hours and half (point 3). 45% consulted 66% of the course, 68% consulted the first 33% of the learning material. If we consider the length and the high technical level of contents these data can be considered as acceptable, compared with other statistics coming from partners' previous experiences (around 30%). However, we believe that thanks to the personalization of user's educational pathway, this percentage can increase dramatically, for two reasons: (i) the educational pathway can be composed by a smaller number of learning objects; (ii) the educational pathway became more interesting, less time consuming and nearer to user's expectations.

Concerning the concluding survey on user's feelings (point 5 – survey copy in "extra heading" section), 55% of users think that course contents are very interesting and related to

[18] http://social.bonynetwork.eu/BONy/wiki/index.php/Main_Page
[19] http://www.pmfonline.net/index.php?option=com_content&task=view&id=57&Itemid=88
[20] http://www.modenacooperazione.org/

the curriculum of European project manager, 35% thinks that contents are just interesting. For the remaining 10% of users, contents are quite interesting, but related to the career of European project manager. 75% of users thinks that there is a clear integration among all the elements (theory, exercises and explanation of collaborative tools such as the Wikis and the Video-conference), and 78% agrees that the whole infrastructure (registrations, course navigation, collaborative tools) is intuitive and user-friendly. A small group of five users finds particularly interesting learning objects on "project resources planning" and "financial management and accounting.

WPs 6&7. *Pinpointing of the dissemination plan. Creation of dissemination tools, organisation of and participation in important events*. The **BONy website**[21] is on line since February 2008. The website is published in six languages (partners mother languages plus English). In 2009 , the web site will be translate in all project official languages. In BONy web site it is possible to reach information about project aims and technological challenges, workplan, end-users and case-studies, partners background and their roles in the project. It is possible to download deliverables and meetings minutes. There is also a virtual space dedicated to all BONy "new and events", where advertise conferences, workshops, articles, and so on. In the home page a "**BONy Quiz**[22]" is published. The quiz is about EU services, institutions and policy. This quiz aims at captive the attention and curiosity of visitors potentially interested on EU cooperation programmes.

The **BONy logo** is thought to get the attention of passionate people and specialists of Wireless communication, Social Network, knowledge sharing, Languages promotion and Semantic WEB:

Figure 2 – BONy logo.

- The "*N*" font and the four little waves on top represent an antenna wireless. This figure represents the possibility to access BONy platform by PDA phone.
- The three little men coloured by flags and linked by hands symbolize a European Social Network available in different languages.
- The puppets heads are linked, symbolizing "knowledge sharing" and "intercultural dialogue" among a multilingual community members.
- Heads' shadow clearly create the international symbol of Semantic WEB.

In addiction to the Facebook and LinkedIn BONy's groups, one **newsletter** has been sent to advertise and invite people to the first BONy eCourse Pilot Test, explaining test aims, timing and modality to access and participate.
The Deliverables 6.1[23], 7.1[24] and 7.2[25], pinpoints the Dissemination and Exploitation plan of BONy Network, clarifying:

- the BONy short and long term end-users group and needs,
- the best dissemination channels and tools,
- results of the Market/Competitors and SWOT analysis,
- the IPRs and commercial strategies for the exploitation of results.

[21] http://www.bonynetwork.eu/
[22] http://www.bonynetwork.eu/bonytest.php?sid
[23] http://www.bonynetwork.eu/download/deliverables/D6.1.pdf
[24] http://www.bonynetwork.eu/download/deliverables/D7.1.pdf
[25] http://www.bonynetwork.eu/download/deliverables/D7.2.pdf

4. Partnerships

BONy wishes to be an European Educational Social Network, a multilinguistic and multicultural forum. A multi-country consortium is a "*conditio sine qua non"* to carry on BONy workplan and achieve project aims. Be part of a multilingual and multicultural consortium is "*in primis"* a significant experience confirming the importance and the viability to work together on common objectives.

The BONy consortium members come from four different EU member states: Italy, Spain, Greece and Poland. The partnership has been set up by using the criteria of complementarity of skills. Each partners is specialised and able to carry on specific workplan tasks. Partners have both technical competence, working experience in a transnational consortium, and good co-operation potential. The partnership is composed by four SME companies and one public research. Partners involvement is based on a solid and stable transnational cooperation; they have been identified as the most suitable ones for their competences, knowledge and wide experience in relation to project objectives and themes. All partners have already been involved in EU projects and their employees are highly experienced in the field of transnational cooperation.
P.M.F. is specialised in LCMS development and creation of multimedia and application for PDA. 4system is dedicated to e-learning contents developments. IDEC is experienced in e-learning tools assessment. INK Catalunya is focused on linguistic e-learning and minority languages valorisation. The C.N.R. I.S.T.C. is a research institute with a long experience in Ontology and artificial intelligence. All partners are experienced in project cycle management.

Consortium members' multicultural background and skills are crucial to create high quality multilingual educational materials assuring excellence of contents in all eleven languages, to transfer of new and fresh know-how on e-learning technologies and innovative methodologies for contents production and assessment.
The international relationships and previous collaboration of consortium members are strategic resources to reach the necessary critical mass of social network users to achieve project sustainability, assuring international dissemination actions and a large geographical coverage of project activities in, at least, the eleven BONy-languages speaking countries (Italy, Spain, Greece, Poland, France, UK and Ireland, Germany, Switzerland and Austria, Hungary, Chez Republic and Slovakia).

Furthermore, the international partnership allowed the consortium member to experiment a positive and fruitful net-working experience, breaking-down physical and structural barriers thanks to ICT tools such as wikis and video-communication system.

An international partnership is also an important opportunity to turn potential competitors in valuable business partners. It is a chance to set up a professional and intercultural team able to carry out complex workplan, and carry on successful exploitation plan at a larger geographical level.

5. Plans for the Future

"where, how, when... learning."

WP2+WP3. Translation of the script course in the remaining 10 BONy languages. Creation of the multimedia course using the SCORM standard and then reengineering it in OWL (Ontology Web Language). The SCORM is the user-machine interface standard. The OWL can be defined as the machine-machine standard. OWL is a machine and intelligent software readable representation of knowledge, where the knowledge is composed by e-course educational contents, users' curricula, users generated content using the BONy Wiki-media.

WP3. State of Art and Technology Transfer on Semantic WEB for Social Network scenario. Technology and know-how transfer.

WP3+WP4. Implementation and integration of Semantic WEB based components to BONy LMS:

- Semantic Research Engine (Semantic Information Retrieval System);
- Ontologies describing educational contents and users' curricula;
- Social Network Infrastructure, including expert finding and reputation modules. Expert finding module is helpful to search users on the base of owned skills. The reputation one is useful to assess and rank users' shared knowledge;
- Intelligent software for recommending, employed to suggest a list of tutors or learning partners and learning objects for educational pathway personalization.

It is important to underline that these modules will convert a normal Learning Management System (LMS) in a Cognitive Learning Content Management System (C-LCMS). In a LMS the tutor establishes contents, timing and learning pathway; users can just decide *"when"* learning. In a LCMS, user can also decide *"what"* learning, selecting the desired educational contents, and *"how"* learning, organizing a personalized educational pathway. In a Social Network scenario, users can also decide *"with whom"* learning, selecting the desired tutor or the virtual classmate.

WP4. Implementation and integration of the PDA client and communication protocols. This module will create a Mobile Content management System. For the first time an e-learning platform can be navigable and information can be retrieved a by a PDA. In this case users are also free to decide *"where"* learning.

WP5. Evaluation Framework on Semantic WEB impact on quality of e-learning:
Second pilot test - November 2009 - assessment of semantic tools impact on quality of e-learning, by:

I. comparison between the entry test versus the final test scores (statistics),
II. percentage of users that finish the course (statistics),
III. users' feedback on usefulness of the user-profiled course and personalised educational pathway (questionnaire),
IV. users' feedback on usefulness of wiki – number of users that use it (questionnaire and statistics),
V. users' feedback on usefulness of information retrieval – percentage of information retrieved and funded; number and type of queries (questionnaire and statistics),
VI. users' feedback on usefulness of social network – type and quantity of knowledge shared (questionnaire and statistics),
VII. users' feedback on usefulness of Reputation system and Expert finding - type and quantity of users contacted, quality of support received (questionnaire and statistics),
VIII. comparison between outputs of the first and second test.

WP6+WP7. Organisation of a final Conference in Brussels in order to present BONy approach, technology to the international community. Organisation and/or participation to others dissemination events. Signature of the consortium Exploitation Agreement.

6. Contribution to EU policies

The BONy consortium wishes to encourage the best use of project results and to improve the quality and efficiency of e-education in the field covered by Lifelong Learning Programme (LLP Obj k) through the sharing of professional and linguistic skills in a Social Network scenario, and thanks to the introduction of some Artificial Intelligence features useful to personalize the learning process. We think that (i) the quality of educational content, (ii) the personalization of the educational pathway and (iii) the interaction among learners, make any learning process more effective and attractive. These are the three pillars of BONy approach to e-learning.

We believe that by augmenting the degree of interaction and personalization of actual e-learning system users can chose to learn only the units strictly required saving precious time. Consequently the learning activity could be imminent with professional needs. Therefore we can dramatically increase the attractiveness of e-training and the number of hours in CVT courses per working hours (LIS-F21).

BONy also aims at promoting language learning and linguistic diversity (LLP Obj g) developing educational materials in eleven languages, offering equal status to west-Europe and east-Europe languages, to smaller linguistic group as so as larger one. Thus BONy Social Network want to be a multicultural and multilingual environment where discuss, not only about Project Management, but also on European education, new educational projects and new learning methodologies.

In term of innovation in ICT-based content, pedagogies and service (LLP – OpOBJ), we are developing an ontological representation of contents in which the semantic interconnection among key-words implies a new approach to the multilingualism management. Thus contents and information are translated and retrieved not by keywords but by concepts. The analysis of BONy Friend-of-a-friend Social Network represent a innovative pedagogies to monitor and assess this new approach to collaborative learning. Therefore, the analysis of the knowledge created and sheared in a Social Network could be a new approach to study the *informal* learning: “a social web driven” learning (LLP – Key Action 3). A PDA phone access to BONy cognitive e-LMS provide innovation in services.

The consortium chose to produce a 11-languages e-course on Project Cycle Management also to promote entrepreneurship (Lisbon Key Competence - KC7) and cultural/linguistic diversity within Europe (LLP Horizontal Policies – a.1). The project cycle management methodology is becoming the main strategy to monitor and assess the production process in SME or large enterprises. Entrepreneurs and employees of the private sector should knowledge the project management as so as more than one EU official languages to be competitive in a global market. We believe that these are two key competences that all European citizens should have to play a key role in the European cooperation scenario. Data reached from the first BONy pilot test fully confirm our choices. 90% of participants at the test confirm that the project cycle management is a very interesting subject of study and it is very important for their own carriers and curricula improvement. Experiments on multilingualism are planned next year.

BONy is also in line with others EU policies in the field of R&D (FP7 - ICT work programme – chapter 2 and 4: Objective ICT-2007.2.1 Cognitive Systems, Interaction, Robotics; Objective ICT-2007.4.1 Digital libraries and enhanced-learning) and Technology Innovation (PSP ICT and eContent Plus – Educational Content).

7. Extra Heading/Section

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Preliminary Evaluation Questionnaire for pilot testing

Please fill in all the questions as required below.
Use from 10 (most positive) to 1(most negative) according to your opinion.

A. Expectations about BONy Training material

1. What do you think about the selection of the topic for the pilot training?

Very interesting									Not interesting
10	9	8	7	6	5	4	3	2	1

2. This course will be very useful for my work.

I agree									I disagree
10	9	8	7	6	5	4	3	2	1

3. I am very interested in experiencing how innovative learning material (theory, exercises etc) and pedagogy work.

I agree									I disagree
10	9	8	7	6	5	4	3	2	1

4. Do you feel confident in using technology (e.g. use of software tools) for learning?

Yes									No
10	9	8	7	6	5	4	3	2	1

5. What are your expectations from this training course in general?

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Concluding Evaluation Questionnaire for pilot testing

Please fill in all the questions as required below.
Use from 10 (most positive) to 1(most negative) according to your opinion.

BONy Training material

1. What do you think about the training material in general?

Very interesting									Not interesting
10	9	8	7	6	5	4	3	2	1

2. The contents appear relevant and useful related to the job of a European Project manager.

I agree									I disagree
10	9	8	7	6	5	4	3	2	1

3. There is a clear integration among all the elements in the course (theory, exercises etc).

I agree									I disagree
10	9	8	7	6	5	4	3	2	1

4. Are the technical issues (e.g. use of software tools) clearly explained and demonstrated?

Yes									No
10	9	8	7	6	5	4	3	2	1

5. Do you think that new and innovative elements introduced in this training are user friendly?

Yes									No
10	9	8	7	6	5	4	3	2	1

6. From your point of view, the training course for European Project Management in BONy could go more deeply into the following aspects:

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7. Were there any topics which were not necessary?

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8. Which topics were most valuable to you?

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