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„LIVING LEARNING" FOR OGRGANIZATIONS COLLABORATION

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The paper considers concepts of Living Labs and e-learning used as a main medium for organizations and individuals collaboration. A living lab is engaging users, companies, universities, governmental bodies in research and innovation a user-centered, open-innovation ecosystem. E-learning techniques, especially Learning Objects pay special role in such environments as they are able to collect and distribute information and knowledge. The paper considers diagrams showing information flow within Living Labs and internal structure of Learning Objects with more user centered approach.

Keywords: E-learning, Living Lab, Learning Objects, Knowledge Management, Collaboration among organizations

1. Introduction

Main hypothesis of the paper is: growing Living Labs need an information environment which could enhance knowledge flow between LL participants that come from different backgrounds as business, government, law, science etc. It could be compared to the concept of experiential learning, where users are immerged in a creative social space for designing and experiencing their own future (Crowd Wisedom, Delphi etc.). This leads to the concept of "living learning" which would use technology and methodology of e-learning in way that could be more productive in terms of dynamic change of the roles between 'teacher' and

'student'. Not only knowledge and theory but also practical education methods using case studies in an e-learning environment are necessary [6]. Key factor is proper identification and storage of knowledge and skills produced during LL activity. The modules that will organize the process are called Learning Objects. The question is what features and parameters make LO more efficient in above mentioned role. The paper describes the internal structure and outside relations of such object. The changing of this situation is possible by implementation of Business Intelligence (BI) technologies, and by introduction of new information and communications systems based on these technologies.

2. Learning Objects and Living Labs

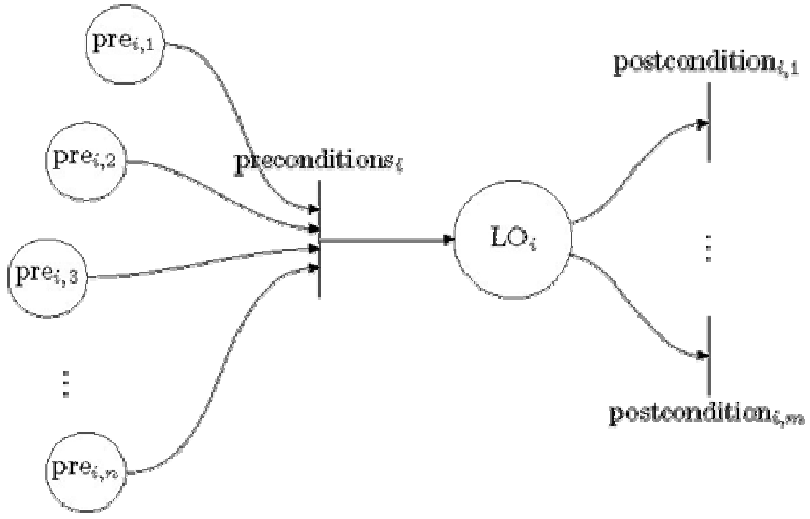

Figure 1. Learning Object in Petri Net notation
Source: Risse T., Vatterrott H.R. "The Learning Objects Structure Petri Net", EURODL 2004

E-Learning gradually matures from a monolithic technical solution to enhance learning with IT to be a technology integrated into E-Business value chains. To reach this goal, an open and interoperable architecture has to be introduced [5].

Motivation can be facilitated through the participation in online networks of practice, but in order to access and benefit from these networks people require a certain threshold level of technical relevant knowledge, which is the most easily generated in local communities of practice [7].

Living labs as open innovation platforms for user driven multi-stakeholder open innovation in complex public-private-citizen context create great opportunities for companies to experiment with various approaches in risk free environment (Fig. 2). Especially distributed innovation networks deliver a perfect playground for living lab collaboration. Various living lab actors can have partly diverse objectives and various levels of commitment and contribution to the collaboration, and thus the applied distributed innovation processes and earning logic must be clearly defined. The living labs concept is clearly positioned within the innovation process, whereas the innovation process itself is discussed on a very general level[3].

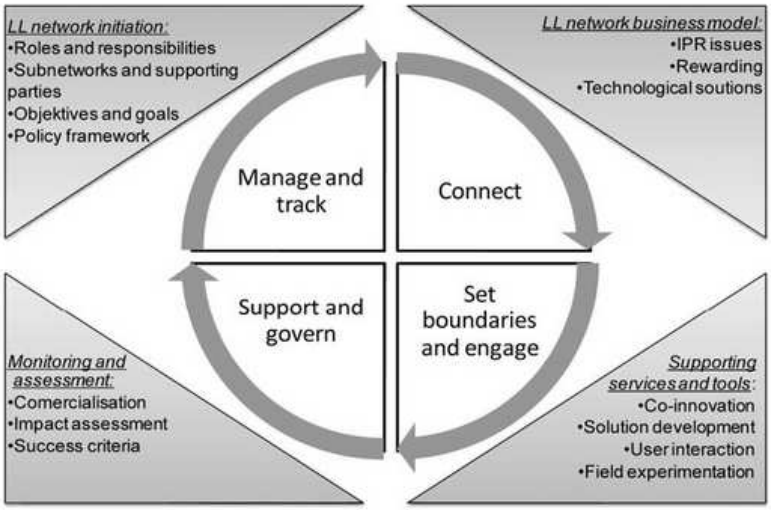

Figure 2. Living Labs structure
Source: Eschenbächer J. "Choosing the best model of living lab collaboration for companies analysing service innovations" in: Projectics 2010/2, 2010 De Boeck

The European Network of Living Labs (ENOLL) is a result of a long discussion in Europe to better institutionalise living labs. By doing both the institutionalisation and standardisation of methods, approaches, tools and software are the overall goal. In 2010, the network has been extended towards 212 living labs all over the world which offer a wide set of competencies, service offerings and ideas evaluation. Some examples:

1. NorthRULL is to offer a new, integrated, user-centered approach to innovative economic and social development, in order to efficiently tackle the central challenges to the vitality of the rural areas of the North of Finland, northern Scandinavia, and eventually the circumpolar regions. NorthRULL will proceed in two main areas of activity, (1) health-related e-services and (2) international tourism industry.

2. The Amsterdam Living Lab is based in a many previous and current projects already underway, like:

- Large scale mobility management by influencing drivers through information and pricing and thereby preventing traffic congestion,
- Better energy efficiency by creating more awareness with users on the use of energy through intelligent surroundings and ubiquitous feedback,
- The creation of change encounters between people living in the same city area and thereby re- enforcing the social fabric of society with the help of digital media and ubiquitous communication.

Important aspect is transforming the knowledge into reusable objects useful for all different kinds of LL users that do not share much common issues. They operate in very different ecosystems e.g. business and government, end users and science etc. The reusability of Learning Objects over different LL participants could be enhanced by object-oriented inheritance relationships.

Inheritance is a way to reuse information by creating collections of attributes and learning contents of learning objects which can be based on previously created objects. These can be defined by classes, which can inherit other classes. The inheritance relationship of classes gives rise to a hierarchy. Simply saying, development of new LO's could be improved thanks to inherited attributed generated by class.

It allows modeling the context of each learning object in terms of preconditions (prerequisites) and postconditions (learning objectives or learning targets). It is the property which makes re-use of learning objects in different courses and in different departments possible[1].

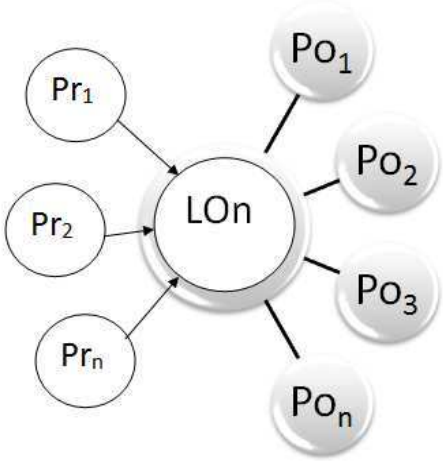

Figure 3. Learning Object structure

Once the metadata is available, it is relatively straightforward to use it. It is, however, much harder and more time- and resource-consuming to produce metadata in the first place. Even the quality of metadata generated by domain experts is subject to changes in domain knowledge. In practice, there are situations in which metadata are impossible to generate without an overall understanding of a large scale complex body of data [2].

In Living Learning concept LO's are almost any peace of content that could be considered as educational: texts, web pages, movie clips, voice, music, learning units, problems or exercises. Each LO is described by its preconditions and postconditions (Fig. 1 and Fig. 3). Preconditions are all requirements that have to be met to understand or solve the problems during LO utilization. In most cases this would be structurized list of knowledge skills that have to be obtained before completion of particular LO. The conditions can be subject of structurization by different levels of classes and inherited. The postconditions are skills and knowledge gained when LO is completed. The postconditions belong to the same structure as preconditions and actually can be also preconditions of different LO's.

The new paradigm of learning process is coming into view. Each user can check if the preconditions are met. If not, he could go back to track missing preconditions as postconditions of different LO. This trip ends when LO with all fulfilled preconditions is found. At the same time it is the beginning of the learning path or even learning multi-dimensional structure [1].

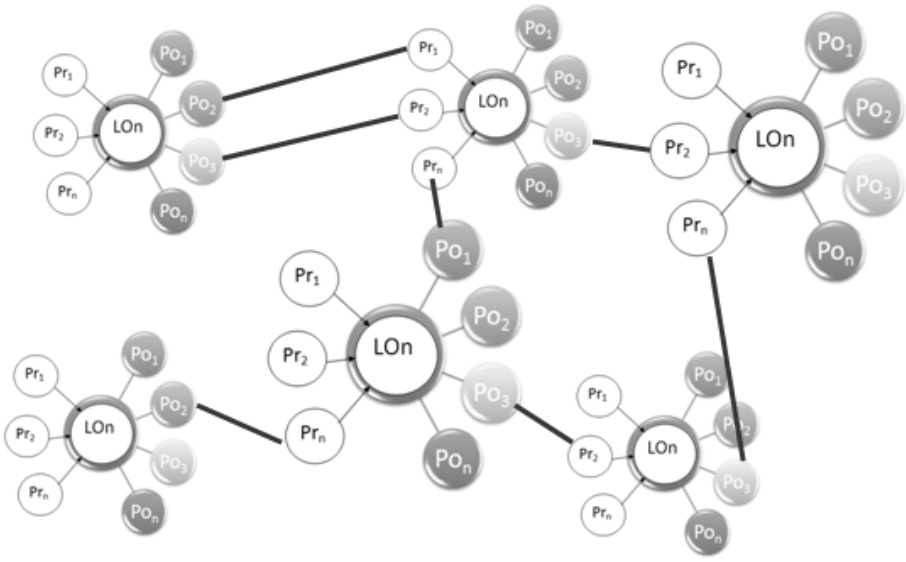

Figure 4. Learning paths based on connections by the preconditions and postconditions

The key feature of Living Learning is open database of all Learning Objects no matter what they contain or where they are located. It only takes to register specific content that should be available on line: a file, a web page, film, exercise etc. The only requirement is to add structuralized metadata mentioned above. The process would be mostly automated thanks to clear classes and inheritance structure. At this stage Living Learning system cannot evaluate the content. Its quality and validity of preconditions selected by user and inherited is the matter of further analysis of system. The evaluation of quality of LO's would be based on such factors as: number of visitors, time spend on it, number of relations to other LO's, users evaluation, exams passed ratio based on LO, preconditions to postconditions ratio, pass through ratio etc. The base for developing of Living Learning LO quality measure could be transformed Page Rank formula by Larry Page. PageRank is a link analysis algorithm, used by the Google Internet search engine that assigns a numerical weighting to each element of a hyperlinked set of documents, such as the World Wide Web, with the purpose of "measuring" its relative importance within the set. In LO case one could calculate *LORank*:

$$LOR(u) = \sum_{v \in Bu} \frac{LOR(v)}{C(v)}$$

The *LORank* value for Learning Object u is dependent on the *LORank* values for each Learnig Object *v* out of the set *Bu* (this set contains all Learning Objects connected to Learning Object *u*), divided by the number $C(v)$ of connections from Learning Object *v*. Above mentioned formula needs to be tested and improved according to numerous factors that could be considered as a potentially valuable for *LORank*.

3. Conclusion

E-learning techniques, especially Learning Objects pay special role in Living Labs environments as they are able to collect and distribute information and knowledge. The concept of "living learning" uses technology and methodology of e-learning in way that could be more productive in terms of proper identification and storage of knowledge produced during LL activity. Living Learning consists of Learning Object structure, LO preconditions and postconditions in structurized hierarchy of classes, connections of LO's by conditions, learning paths and structures, LO evaluation based on algorithm similar to PageRank.

REFERENCES

[1] Risse T., Vatterrott H.R. "The Learning Objects Structure Petri Net", EURODL 2004.

[2] Chen, C.: Information Visualization Versus the Semantic Web; in: Geroimenko, V., Chen, C.: Visualizing the Semantic Web; Springer, London 2003, ISBN 1-85233-576-9, pp. 15-35.

[3] Eschenbächer, J.; Thoben, K.; Turkuma, P. "Choosing the best model of living lab collaboration for companies analysing service innovations," in: Projectics 2010/2, 2010 De Boeck.

[4] Xi'an, Chin "Enhancing Reusability of Learning Objects with Object-Oriented Inheritance Relationships" ICPPW 2007.

[5] Bussler, C. Fensel, D. Lischka, J. Karagiannis, D. "A generic E-learning Engineering Framework Embracing the Semantic Web" in: Artificial Intelligence: Methodology, Systems, and Applications - Lecture Notes in Computer Science, 2004, Springer Berlin / Heidelberg.

[6] Kakehi, M.; Yamada, T.; Watanabe, I.; „PLM Education in Production Design and Engineering by e-Learning" in: International Journal of Production Economics, vol. 122, no. 1, November 2009.

[7] Hildrum; Jarle, M. "Sharing Tacit Knowledge Online: A Case Study of e-Learning in Cisco's Network of System Integrator Partner Firms" in: Industry and Innovation, vol. 16, no. 2, April 2009, pp. 197-218.