СТИМУЛИРАНЕ НА РАЗВИТИЕТО НА ПЕРСОНАЛНАТА КОМПЕТЕНТНОСТ ПРЕЗ ЦЕЛИЯ ЖИВОТ ЧРЕЗ ТЕХНОЛОГИИ

STIMULATING LIFELONG COMPETENCE DEVELOPMENT THROUGH TECHNOLOGY

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Резюме: *Съвременното общество, базирано на знания, поставя нови изисквания пред образователния сектор за подържане както на отделния обучаем, така и на учещата организация като цяло. В ерата на учене през целия живот, което е един от най-важните мотори на образованието през 21 век, електронното обучение се превърна в процес на сътрудничество, базиран на професионални общности. Това налага създаването и използването на методологии и инструменти, които могат да подържат автономното и динамичното изграждане на общности, управление на знания и нови разпределени услуги в технологично-базирана среда. Настоящата статия е фокусирана върху загрижеността на компаниите за развитие на техния потенциал и ефективно използване на ресурсите. Изследването представя системния подход и основните резултати от внедряването и пилотния експеримент на интегрираната организационна и технологична инфраструктура за развитие на персоналната компетентност през целия живот Personal Competence Management System, създадена в рамките на FP6 IST-TEL TENCompetence project (2005-2009), в реална индустриална среда.*

1. Background

The conclusions of the Joint International Workshop [1] provided a pool of interesting and highly related topics about the synergy between Professional Learning, Competence Development and Knowledge Management (KM). In fact, there is a gap between well organized, but monolithic and inert e-Learning material such as courseware and flexible knowledge bases that are often not able to activate learning processes. An integration of KM and e-Learning, especially by using Web2.0 technologies, could dramatically change today's understanding of further education towards lifelong learning fed by dynamically changing public and organizational knowledge repositories. Web2.0 technologies already incorporate the network paradigm of continuous documentation, sharing, and construction of new knowledge. Current pedagogical and organisational models for learning do not meet the demands and possibilities of lifelong competence development and the new learning technologies that are available [2]. For individuals, groups and organisations it is hard to get an overview of all the possible formal and informal learning opportunities that are available and to identify the most appropriate ones. For an organisation it is hard to assess the competencies of applicants, employees and learners who have studied and worked in a variety of settings or multiple countries. The availability of support is crucial for effective task performance. Current e-learning environments provide too little effective and efficient support to the users. Worlds of knowledge management, education, training and informal learning are not integrated well enough: many fragmented methods and tools. Life Long Learning Networks and Competence Development are two relevant topics focusing on continuous education to support new ways to our professional development. Getting some personal competences that provide a good framework beyond the established curriculum is a crucial issue to get and consolidate any professional position. Learning networks are an excellent way to acquire and to share knowledge in an informal communication process. The combination of both topics enables the development of tools and methodologies to improve personal competences while, possibly at the same time, contribute to the development of other learners.

The requirements of the models and technologies to support such integrated facilities differ considerably from those traditionally required from technologies that support e-learning, or to enable company knowledge dissemination and knowledge management needs. The lifelong competence development of each individual and the multi-institutional and episodic nature of this learning are not reflected in today's mainstream learning and knowledge technologies and their associated architectures.

However, questions arise how these methodologies and technologies of the different domains fit together in order to ensure that the learned can be transferred to the workplace and to improve the performance of each individual? How can we foster interaction and provide a personalized learning experience according to the current situation and context (e.g., flexible guidance for self-directed learning, adaptive content selection and structuring)? How can we better use existing networks for competence development and how can we ensure that learning goals are based on real-world needs? How can we engage learners and actively involve them in the learning process through interaction?

2. The Synergy between Professional Learning, Competence Development and Knowledge Management

The high potential for synergies between Knowledge Management and e-Learning seems obvious given the many interrelations and dependencies of these two fields. However, the relationship is not yet fully understood and harnessed. KM addresses learning mostly as part of knowledge sharing processes and focuses on specific forms of informal learning (e.g., learning in a community of practice) or on providing access to learning resources or experts. Current KM technologies focus on knowledge acquisition, storage, retrieval, and maintenance. However, regarding the deployment process, learning is considered to be a fundamental part of KM because

employees must internalize (learn) shared knowledge before they can use it to perform specific tasks. E-Learning systems might also benefit from KM technologies. Especially the ones focusing on the support of technical and organizational components can play an important role concerning the development of professional e-Learning systems. During the last years, so-called Web2.0 technologies, such as Wikis and Blogs, received more and more attention and they are currently used in many different domains. So far, these technologies seem to have a positive impact in terms of community building, knowledge sharing, and content creation - even if their success has not been empirically proven. First questions arise, to what degree these systems (e.g., Weblogs, Wikis, XML/RSS based content syndication and aggregation) support certain learning processes.

The research work and practical experiences of the European projects TENCompentence (www.tencompetence.org) and ProLearn (www.prolearn-project.org) lead up to creation of innovative solutions for lifelong competence development that stimulate and support individuals, teams and organisations to (further) develop their competences, using all the distributed knowledge resources, learning activities, units of learning and learning routes/programmes that are available online.

3. The TENCompetence Approach

TENCompetence is a 4-year EU-funded Integrated IST-TEL project (2005-2009) that develops a technical and organisational infrastructure for lifelong competence development. The infrastructure uses open-source, standards-based, sustainable and innovative technology. With this freely available infrastructure the European Union aims to boost the European ambitions of the Knowledge Society, by providing all European citizens, SMEs and other organisations easy access to facilities that enable the lifelong development of competencies and expertise in the various occupations and fields of knowledge.

The infrastructure supports the creation and management of networks of individuals, teams and organisations in Europe who are

actively involved in the various occupations and domains of knowledge. These 'learning networks' supports the lifelong competency development of the participants from the basic levels of proficiency up to the highest levels of excellence.
The solution developed (Fig.1) is personal competence management in learning networks that comprises related theories, methods, systems and standards. A learning network is a network of professionals aimed at the exchange of knowledge and competence development in the field [2].

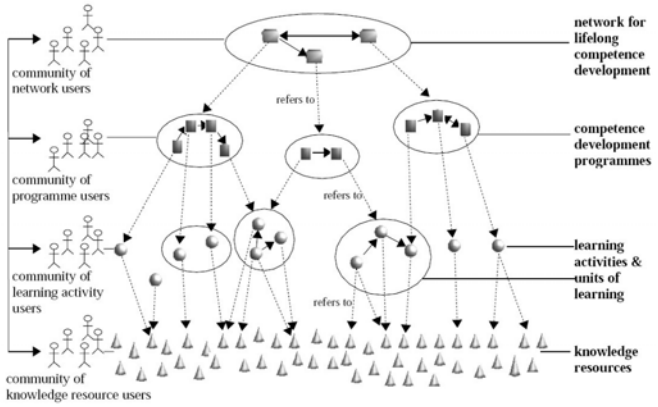

Figure 1 Hierarchical structure of personal competence management - Integration of networks and communities

A competence can be assumed as a node in the network. Each competence has one or more assessments connected to it. Each competence is connected to learning actions - formal, informal, from different institutes and persons sharing these actions. The term competence has become a widely used term in discussions and technical-scientific literature that deals with organizational or workplace learning in the last years. According to the TENCompetence definition, a *competence* is the estimated ability of an actor to deal with critical events, problems or tasks that can occur in a certain situation (at work, at home, etc.). This estimation can be based on: self assessment, informal assessment by others and formal assessment by others. A *Community of practice* is a group of users who are regular actors in a particular situation and in a particular context. They can share their understanding of competence profiles and competences, as well as their competence development plans, learning actions and resources. They can communicate, exchange their experience and opinions, support each other and provide various kinds of feedback. Communities are on the top level of the Personal Competence Management (PCM) System data structure hierarchy. Each Community can contain one or more Competence profiles. Competence profiles cannot be shared by different communities. A *Competence profile* is a set of necessary competences to handle certain situations. The competence profiles for the same situations or professions may vary from community to community even though the required behaviors are exactly the same. A competence profile relates to one community.
A Competence is part of a Competence profile and can contain one or more alternative Competence development plans. A *Competence Development Plan* is a structured setup to support acquiring a specific Competence. PCM supports personal development of such plans instead of the traditional "top down" approach. There can be alternative plans for development of a certain competence and the user can choose one that best matches his or her preferences and requirements. A Competence Development Plan is part of a Competence and contains Actions. An *Action* is a learning activity that a user has to perform to meet some educational objectives. It contains a description of the activity and a list of learning resources. An Action is part of a Competence Development Plan and can be also part of a Route. A *Resource* is any kind of knowledge resource that can be used in learning. All Resources are linked to the Community in which they are defined and once specified they can be linked to as many Actions as applicable. By adding them to an Action the resources are placed in a learning context in which the user can use them in order to achieve a certain goal. An Action can reference one or more Resources. A Resource can be a web document specified by its URL or any other resource than can be identified by its Title and Description. The user can rate and comment the current resource, post in the forum, and view the resource there.

4. Personal Competence Management System (PCM 2.0)

The main TENCompetence product is the Personal Competence Management System 2.0 [3] that can be considered a new "product" or service type in the area of the individual learner's competence development (Fig 2).

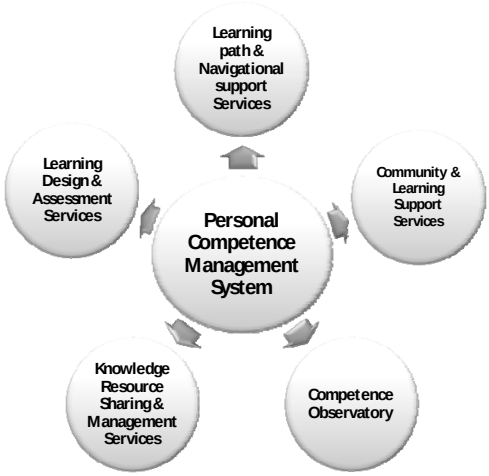

Figure 2 Personal Competence Management System - High level overview of connected services

The system comprises variety of tolls: PCM - Personal Competence Manager, PDP – Personal Development Plan tool, LearnWeb2.0 - Share Knowledge tool, ReCourse Learning Design Editor, Learning Design Runtime Tools, etc [4]. It supports users in managing their competence development activities across a wide range of contexts.
The users can be divided into three main categories: *Learners*, *Tutors* (Teachers, Coaches, and Trainers) and *Authors* (Creators).
Learners are the group of TENCompetence users that can have the following needs: (1) Keep up to date with existing function or job; (2) Study for a new function or job; (3) Improve current job level; (4)Reflect on current competences to search for other functions or roles; (5) Define new learning goals; (6) Require support on a non trivial learning problem; (7) Explore the possibility in a new field (learning network) to help define new learning goals. The main goal for the learner is to acquire the necessary Competences that are required for a selected Competence profile.
Tutors (Teachers, Coaches, Trainers) is the group of PCM users that can have the following abilities (1)Provide input for developing a specific Competence; (2) Support an individual to acquire a specific Competence; (3) Support a group to setup a 'learning path' based on specific educational concept(s). The expertise for Teachers can be Subject Matter related (SME's) or based on Pedagogical & Organizational skills in relation to education in general as well as specifically for Lifelong Competence Development. The main goal for the teacher is to provide guidance and support groups or individuals who are willing to obtain specific Competences. This support can be on different levels: Providing guidance to learners; Preparing live training-sessions (lectures, workshops, etc.); Answering questions from learners and Participating in and contribute to forum-discussions. In practice the distinction between these groups will not always be strict. In many cases a learner can be a teacher as well and vice versa. A teacher can provide content for specific training goals as well. Because there can also be interest from third parties (e.g. government, educational experts, policy-makers) we will consider this group too.
Authors ("Content providers") are the group of PCM users that can provide input for developing a specific Competence. The expertise for Authors can be Subject Matter related or based on Pedagogical & Organizational skills in relation to education in general as well as specifically for Lifelong Competence Development. The main goal

for the Author is to provide the information on their expertise for groups or individuals who are willing to obtain the Competences. This support can be on different levels:

- Setting up a Community. Within a Community a wide range of Competences can be available. Consider the most suitable authorization-structure for a Community. In some cases it's important to restrict the rights for adding or changing the content in a Community, because of the required specific expertise. In other cases input from many different angles should be allowed for a Community, because know-how and skills from all kind of disciplines are required.
- Providing a Community with information on Competence profiles and/or Competences
- Providing a Competence with a Competence Development Plan or separate Actions.
- Providing Actions with Resources.

Third Party - this group is interested in the general concept and structure of PCM. The members of this group can be policy makers, service providers, educational experts, etc. The main goal for the third party is to get an overview of PCM and find out if this can be suitable for their objectives. Their main interest will lie in mapping their input with the possibilities PCM offers; Explore the concept of lifelong competence development and Map their expertise with the TENCompetence-structure (e.g. add training, compare educational concepts, and contribute discussions). The boundaries between the different groups are thin. A Learner can in his/her 'quest for know-how' run in useful Actions or Resources and share this with the rest of the Community. Authors and Tutors can learn how to improve their resources and teaching, based on the contributions and feedback of other members in the community. Depending on the structure of a Community and Competence profile more or less freedom is given to users regarding their active development of the created structure and resources.

Produced as part of the Personal Competence Management System (PCM 2.0), the *Personal Development Planner* (PDP) tool positions the lifelong learner in relation to a target competence profile and assists in identifying and making good short comings in their skills set. The PDP is a web-based learning tool that uses TENCompetence services and data to deliver a wide-ranging choice of professional or personal competence profiles. It provides learners with easy access to their competence proficiency levels based on the established EU Qualification Framework (EQF). The Personal Development Planner has positive effects in learners' motivation and confidence since they enable individuals to reflect upon their own learning and to plan for their own educational development according to their personal interests, background and experience. Despite those benefits, there are not many efforts considering the role of learners in the creation of their own learning paths. The PDP follows a simple user-friendly workflow process starting with planning and assessing personal strengths against the skills required to achieve a given competence profile. Once a user has defined his or her goals (e.g. to achieve a new professional goal, or update proficiency in a field), they can search for learning activities which will assist them in attaining the required competence level. At all times progress and experiences can be logged in a weblog and shared with others.

Produced as part of the Personal Competence Management System (PCM 2.0*), LearnWeb2.0* is a tool for the management and sharing of knowledge resources. More specifically, it provides users with the convenience of a single environment from which to access Web 2.0 tools best suited to the competence development process. It enables access to a wide array of resources from all over the web which can then be exclusively tagged, rated and commented on by TENCompetence users for TENCompetence users. This is achieved by isolating competence focused feedback from that of standard Web 2.0 users. In this way, members of a TENCompetence community are better able to make informed opinions on the value of resources for the purposes of competence development.

LearnWeb 2.0 supports spontaneous communities of people wishing to collaborate. It is intended for use by both learners and teachers who wish to share resources and opinions of resources with peer users. It can also be used to facilitate contact between people with similar interests. The LearnWeb 2.0 infrastructure brings together information stored on institutional servers, centralized repositories and community sharing systems. The functionalities of existing Web 2.0 applications are combined and accessed through an integrated platform that facilitates sharing, discussion and the creation of resources for subsequent propagation of user managed information across social networks. The system gathers information in an integrated environment and makes it easily accessible through its distributed and modularized infrastructure and single sign on (SSO) functionalities. LearnWeb2.0 includes two interfaces: interactive web pages for direct use by people; and automatic web-service methods for interacting with other tools like Course Editors, Community Managers etc.

5. The Case Study: EPIQ Business Demonstrator

This section of the paper presents main achievements related to the implementation of the business model demonstrator for the high-technology company EPIQ. The successful implementation of the business demonstrator for the high-technology company in electronic industry has a unique piloting scenario because it involves an organisation, that has no previous experience with the "competence" concepts, and has to make the entire shift (both methodologically and practically) from the traditional types of training and (some) knowledge management, to the competence-based HR management process, supported by the TENCompetence infrastructure. As a first step in the EPIQ Business Demonstrator design, an intensive research, unstructured interviews, review of existing documents and plans were made. The conclusions include the following company bottlenecks:

- There is a lack of competence profiles. Job descriptions are available, but not a detailed and well structured competence catalogue.
- Absence of assessment centre. Also, it is hard to assess the competencies of applicants, employees and learners who have studied and worked in a variety of settings and multiple countries
- Current training practices provide too little effective and efficient support to the users. The availability of support is crucial for effective task performance.
- Current pedagogical and organizational models for learning do not meet the demands and possibilities of lifelong competence development and the new learning technologies that are available
- The traditional topic-based onsite corporate training process is time-consuming and a better effectiveness is desired
- There is no centralized knowledge management system or a digital repository of learning resources available. Very detailed materials, instructions and training plans are available though.
- Narrow focus on ICT tooling & innovation. There is a lack of tailored virtual learning support.
- Worlds of competence management, knowledge management and organisational learning are not integrated: many fragmented methods & tools
- For individuals, groups and organizations it is hard to get an overview of all the possible formal and informal learning opportunities that are available and to identify the most appropriate ones.

In EPIQ most working processes are very knowledge intensive and involve many people working at different locations and on different tasks. The context in which people are working is changing constantly through changing work processes, different tasks or problems to be solved, and evolving technologies which are used at work. These facts require life-long competence development. Competence development takes mostly place during informal learning at the workplace. The learning process is characterized by self-organized activities such as selecting the environment for learning (e.g., Internet), defining learning goals (e.g., related to a work problem), finding and selecting content for learning (e.g., websites or colleagues), and following a preferred learning path. Beside a continuous formal competence development, sharing

knowledge among members of the organizations and making ones knowledge explicit for others is crucial. Working and learning takes place in a network of people, tools, environments, and knowledge. These networks facilitate interaction and communication. The use of available e-Learning and Knowledge Management applications in a network setting can help to address the challenge of continuous competence development in the company. The main research and evaluation questions addressed during the EPIQ business demonstrator were the following:

- To find the most appropriate methods to introduce and present the new concept for lifelong competence development and the new integrated Personal Competence Management System to the company management, HR specialists and trainees with a high professional level in the context of both electronic industry and ICT.
- To discover the optimal way to interweave mastering both the process of the competence management and the Personal Competence Management System (PCM 2.0) within a real industry environment.
- To evaluate the business benefits of the implementation of the TENCompetence solutions through mapping the business demonstrator issues to the European Foundation for Quality Management (EFQM) Excellence Model. This model recognises that excellent results with respect to performance, customers, people and society are achieved through leadership driving policy and strategy, that is delivered through people, partnerships and resources, and processes.
- To find the right balance between the face to face and technology enhanced training, enabling on-the-job learning to be implemented.

The introduction of the TENCompetence methodology, organisational and technological infrastructure influences key management processes (Fig.3). This makes it a project that has its scope in the mid- and long-term plans of the company, because the processes take time to develop and become an established practice. The business demonstrator has one of its first tasks to influence the company decision-makers to adopt the innovative concept, which requires their familiarisation and support through working/learning seminars, brainstorming, etc. This is a delicate and time-consuming process, since the management has a lot of responsibilities and are usually the most difficult to reach target group, especially during the last months of the world economic crisis.

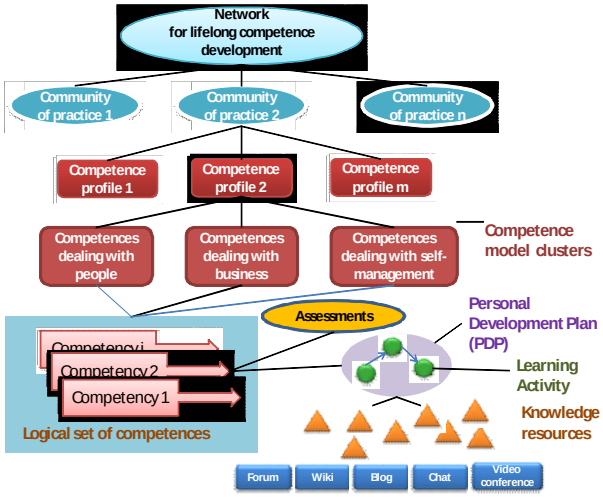

Figure 3 Implementation of the hierarchical structure of personal competence management

Nevertheless, the representatives of the management in the Bulgarian business units demonstrate a deep interest to implement and further disseminate the TENCompetence organisational and technological infrastructure at an international level (Belgium, Germany, France, Czech Republic, and Mexico). At community and individual level, there is no experience or established practices for competence management and technology-enhanced learning. This starting point also makes it hard to implement the innovative TENCompetence concepts, and in turn requires time and systematic preparation and implementation. Despite of these limitations, we achieve a satisfactory progress, with a tendency for a sustainable implementation in the EPIQ group. Due to the fact that EPIQ is a high-tech organisation with a huge number of competence profiles (more than 140) and individual competences the pilot is focused on 8 key job positions, which have their complete competence profiles prepared following the competence profile model presented on Fig. 4.

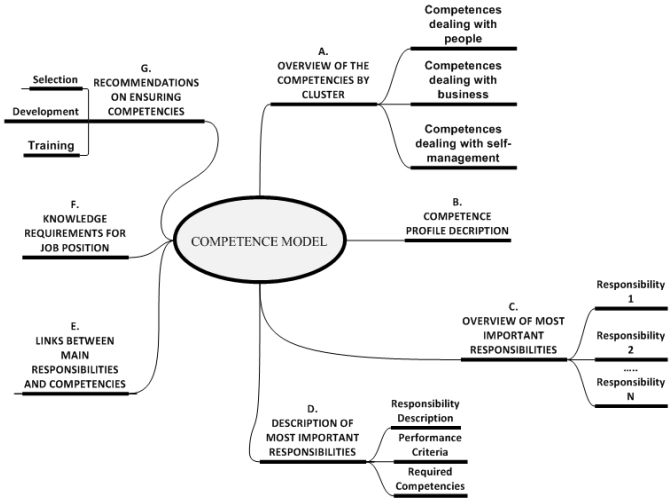

Figure 4 Competence Profile Model

A proper training has been designed and learning activities have been conducted for a limited number of competences (10) as an example practice for the company HR management to follow. Further trainings and resources will be designed for all competences as an ongoing process during and after the business demonstrator is over.

6. Conclusions

This paper addresses the everyday concerns of companies striving for superior performance and effective utilisation of resources. It is a new treatment of the Personal Competence Management System concepts and services that is consistent with business strategy. As a whole, the impact of the business demonstrator implementation and adoption of the "Competence" concept at the high-technology industrial company has lead to the improvement and introduction of new HR-related processes and activities including Recruitment & Selection, Performance Management, Training & Development, Succession Planning & Capability Mapping, Assessment Center Design and Establishment.

7. Acknowledgment

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