

A CONCEPTUAL INTEGRATED ICT - BASED LEADERSHIP LEARNING AND TRAINING ARCHITECTURE

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ICT SYSTEM FOR LEADERS DEVELOPMENT

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Abstract: *The principal aim of this paper is to provide integrated enterprise leadership learning and training architecture or platform. The proposed architecture is defined in the form of interrelated functional blocks or subsystems, including descriptions of their purposes and functionalities. Block or subsystems are different tools, technologies and resources which support leadership learning and training processes and activities. The integration of two learning and training environments is proposed: web-based and non-web based or in-house environments. Although our first intention was develop an architecture which supports leadership learning and training, but our work resulted in a generic, conceptual and reusable environment model which describes the technical components needed for a complete ICT learning and training infrastructure. Didactical considerations, content design processes, learning and training theories and design of related processes are outside the immediate scope of this paper.*

Key words: *learning and training architecture, computer-based learning and training, e-learning, web-based learning and training*

INTRODUCTION

The very fast evolution of technology and its widespread use has drastically changed the concept of learning and training (LT). In the last two or three decades we have been witnessing a constant change in LT methods and the emergence of many new forms of LT activities, independently of domain and purpose of learning. New LT approaches, focusing predominantly on learning by experience, learning to learn independently, and explorative learning, can be easily supported by modern information and communication technology in many different ways. Therefore, technology has great potential to improve LT activities, but only if these activities are based on an appropriate technical infrastructure or platform.

On the other hand, enterprises should be firstly interested in the education of their employees and secondly in the implementation of these platforms in their business environment. We can generalize that currently enterprises, especially the biggest and the richest one, are now more than ever aware of the great significance of the continuing education of their employees, particularly of their managers. Consequently companies invest in the education of their employees by organizing training programs for the

improvement of their leadership skills on their own or with the help of a third party institution. Mostly these programs concentrate on LT generic skills and are not personalized, nor encompass LT of specific skills needed for further development of a leader's career. The majority of the proposed programs is domain independent, but there are also programs tailored to specific enterprise needs and requirements, which is an essential prerequisite for effective and efficient LT. Another weakness of these generic programs is that they are designed for managers on low and medium levels, but not for the highest management where leadership skills are the most important.

Today's LT is predominantly technology-enhanced, computer-assisted, and in most cases (only) web-based [1, 2]. However, for implementation of successful LT a complex LT platform is needed. The platform should support continuous LT by providing life-long enterprise learning and also providing an active changing of employees LT plans with regards to the progress assessed after finishing a set of LT activities, acquiring planned skills and knowledge. LT should as much as possible be self-paced and tailored to individual needs and the actual skills and knowledge of an employee which have been gathered in their LT profile. The platform must support communication, cooperation and collaboration with other participants of the LT course or program, continuous assessment, testing and reporting the progresses in skills and knowledge acquirement. The platform should be a convergence between stand-alone and networked resources, and because of specifics of the work conditions of managers who are often out of office there is also a need for a platform which supports mobile LT.

This paper presents our proposal of an integrated LT environment which satisfies the above described conditions, integrates contemporary software, hardware, communication and learning technologies and methods, from face-to-face to distance and ICT-learning, and represents an integration of enterprise in-house, non-web solutions with those which are web-based. The platform has been built during leadership LT needs and requirements research, but it is flexible, robust and reusable enough to be used in any other LT domain. Because the architecture should be derived from enterprise LT needs and objectives, first the overall process of architecture design has been defined.

With the aim of presenting information and communication technology (ICT), supporting LT processes and a framework of a conceptual integrated LT environment, this paper is structured as follows.

Section two presents the background on leadership LT, and leadership skills, the characteristics and requirements that influence the selection of appropriate LT techniques and methods. Section three is dedicated to the description of the overall process of the leadership LT architecture design we defined. In section four conceptual enterprise LT architecture is presented in detail. Section five concludes the paper with discussion and description of future work.

LEADERSHIP LEARNING AND TRAINING CHARACTERISTICS AND REQUIREMENTS

In literature there are many definitions regarding leadership. Northouse defines leadership or "effective administration" as "a process whereby an individual influences a group of individuals to achieve a common goal" [3]. Chemers stated that leadership is a "process of social influence in which one person can enlist the aid and support of others in the accomplishment of a common task" [4]. Ward it defines as "the art of motivating a group of people to act towards achieving a common goal" [5] or as "a winning combination of personal traits and the ability to think and act as a leader, a person who directs the activities of others for the good of all" [6]. There are many other definitions, however, the common belief in all these definitions is, that leadership is something you can learn, and that includes skills you can train. Leadership training is one of the most effective methods of development of leadership skills. "Skills approach suggests that knowledge and abilities are needed for effective leadership [...] Leadership skills are the ability to use one's knowledge and competencies to accomplish a set of goals or objectives" [3] and "skill-based training is defined as a planned event designed to teach the specific knowledge and skills required to enhance performance" [1]. Therefore, leadership skills are abilities which a leader can acquire through appropriate training. The most important among these are the skills of effective communication, listening and leading skills, relationship skills and alliance building, skills in delegating task to others, problem solving, coaching, motivating, decision-making, etc. According to Stockley, learning "is a major outcome" [7] of training, or its consequence or result. Therefore, systematic and continuous LT is also essential for acquiring leadership skills.

THE PROCESS OF LEADERSHIP LEARNING AND TRAINING ARCHITECTURE DESIGN

According to our firm belief that before starting with the design of LT architecture or/and infrastructure, LT needs and objectives, participants and programs should be determined and designed.

This is possible only throughout a well defined set of phases, forming the process of architecture design. The resulting architecture should be comprised of all technologies and support all methods needed to satisfy the needs and objectives of LT. Because LT changes over time, so do technologies and methods, the infrastructure should be flexible and robust enough to permit future changes and upgrades.

Leadership LT therefore encompasses knowledge and skills needed to prepare the employee for work as leader person or to improve the knowledge and skills of employee already working as leader. For systematic LT, the systematic design of an appropriate platform is needed. In Figure 1 the overall process, divided into 6 steps, of architecture design is depicted. The process was based on the findings of the literature review, also taking into consideration Yukl's description [8,9] of the most important preconditions for quality educational process that should be fulfilled: (1) clear learning objectives, targets, expectations, skills and knowledge to acquire should be set; (2) the programme content should be clear and unambiguous, and should include as many as possible concrete examples; (3) the program should consider the prior knowledge of participants; (4) LT methods should be combined and adjusted to the LT outcomes and to the conditions in which training is held; (5) LT must enable participants to actively apply acquired skills in practice; (6) a constructive and timely assessment of the degree of progress should be constantly provided to participants.

The first step of the process of LT architecture design is the determination of leadership LT needs and objectives of the concrete enterprise. These needs should be derived from business needs and the working environment and its specifics, but they should also be based on findings of known theories of leadership skills and leadership. Once defined, they are an essential part of an enterprise competency in which all core competencies and key abilities and skills for each job or position within the enterprise are determined. Based on a competency model, LT needs for each job or position are also defined. From competency models individual LT plans are derived.

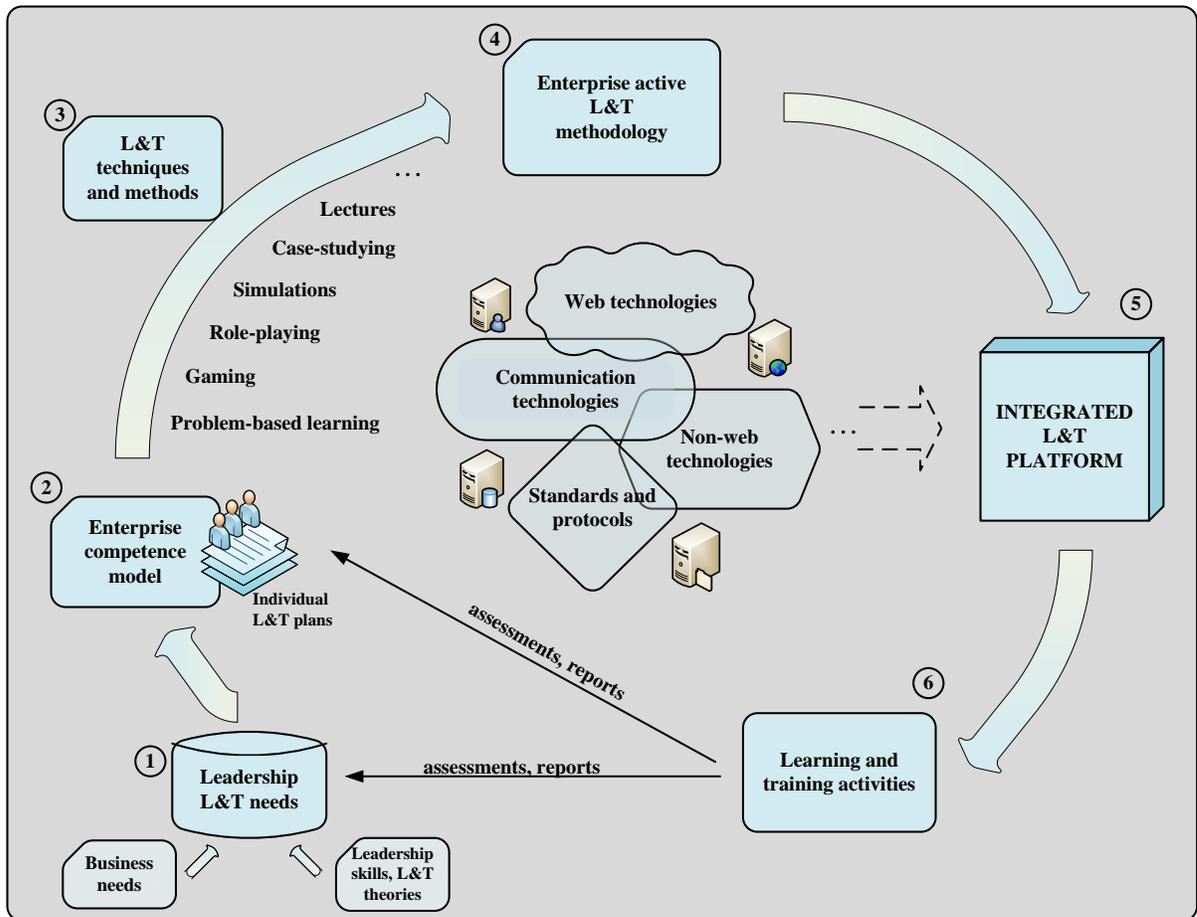


Figure 1: The overall process of LT architecture design.

Plans must be determined prior to the beginning of the LT activities. Individual plans should also consider the actual knowledge and skill levels of employees, their motivation and abilities to understand and remember complex information.

Learning and training techniques and methods

Selection of the most appropriate LT techniques and methods that will fulfill set goals, objectives and individual plans is the next step. The most frequently used LT techniques that should be included in leadership LT program, are: (1) lectures (classical classroom-based face-to-face lectures for a group of participants with common LT needs where a teacher explains the topics regarding leadership activities, approaches, styles, theories, skills, etc.); (2) role-playing (a situation where one participant takes on a new person and acts as if he/she were someone else, with a different role, as a leader); (3) behavioral role modeling (a technical procedure of developing interpersonal leadership skills, derived from demonstration

and role playing; the essence of the learning is observation and copying of others' behavior and application of such behavior in practice, where appropriate); (4) case study (one of the most common techniques of leadership LT; cases that have to be analyzed are usually descriptions of real events which have occurred under similar circumstances to the work circumstances of the participant); (5) business games and simulations (aimed at practicing and teaching problem solving, interpersonal, analytical thinking and decision-making skills; participants are faced with the consequences of their decisions made during playing the game, which simulates events and situations from real business life); (6) problem-based LT (encompasses skills of effective and successful problem solving; during problem solving, the participant must first define the problem and assess a current situation, then find or generate alternatives, evaluate them and select the right ones, and finally, implement solutions).

To define enterprise active LT methodology, a proper combination of LT methods must be chosen. Various LT techniques can be executed or implemented with various different methods and in different environments. According to Oliver [1] there is a conviction in education theory, that the most effective and powerful forms of learning are those which contribute to the creation of knowledge and enable learners with complete cooperation, collaboration, and communication. Regarding the degree of knowledge construction and collaboration, various classifications of LT types were made. According to Collis and Moonen [10] technology-supported LT can be classified in four basic categories: (1) LT by only accessing information repositories - contents of information repositories are not organized for instruction and there is little or no human interaction, (2) distance participating in web-based courses where content is pre-structured and communication limited only within a course, (3) regular classroom-based LT with blending use of web resources where content is still pre-structured, but courses include also contribution activities, and (4) "participating in communities of practice for learning and knowledge building", where content is co-constructed by participants and collective knowledge building and reflection are constructed.

Therefore, the three basic methods of LT, (1) *classical LT* (known also as face-to face, classroom-based or conventional learning), which comprises classical fixed-schedule lectures (fixed time and place), with support of mostly printed materials without using computers or other digital equipment, (2)

computer-based LT where computers and CD ROM's or DVD's or memory cards with educational programs, video and audio materials, text files, multimedia presentations and other digital materials are used in the LT process, and (3) *web-based LT* (known also as internet-based or online or virtual LT) which encompasses synchronous and asynchronous LT activities, where applications, resources and tools are available through web sites and web repositories; the participant can use the web as a learning tool while participating in a formal programme or can directly participate in one of the online courses (because the web-based LT forms an important part of our LT environment it will be discussed more precisely in the following section) should be combined in blended or hybrid LT. The most widely used and known form of current blended learning is distance or e-learning.

Distance or e-learning is a conjunction of web-based and computer-based LT. Because of the possibility for participant to choose the time of taking training on the basis of his or her work obligations and schedule (i.e. self-paced training) and his or her training needs, there is an increasing interest in distance learning also for LT of leadership skills. Distance learning makes it possible for participants (virtual team or group members) to collaborate and communicate using electronic communication and collaboration technology at any time, regardless of the differences in geographical distance, organization, or culture [11]. Globalization and the improvement of distance learning technologies make this kind of blended LT method more cost-effective and flexible than classical classroom-based LT.

In this paper the focus is on LT methods that are based on the usage of modern ICT, either exclusively (all LT processes are computer or/and web based), or partially (ICT is only partially used in LT processes). For the purposes of our study, the term *ICT-based LT* has been introduced. ICT is a broader term and it includes not only distance LT technologies and systems but also all software and hardware systems, databases, and communication paths between them that make part of LT environment and are not accessible (only) through web or internet, but can be (only) an integral part of an enterprise business information system.

After enterprise LT methodology is defined, web, non-web and communication technologies are, relying on standards and using protocols, combined in an integrated LT environment that supports blended, collaborative LT and all forms of communication and cooperation.

Learning and training conceptual architecture model

Because of the rapidly growing importance of LT of all of the employees of every enterprise and, not only of leaders and managers, ICT supported LT environments are becoming an important component of the whole enterprise IT infrastructure. One of the most important steps during establishment or development of enterprise LT environment is the design of LT architecture. This architecture should comprise various disparate systems and tools and should be reliable, robust and flexible enough for future changes. To maximize the LT effects these disparate (sub)systems should be consolidated, i.e. properly integrated, interoperable and interconnected using common standards and protocols.

Systems and tools can be theoretically all developed (and maintained) exclusively by the enterprise itself or they can be developed on demand by a third-party company, or they can even be all hired (contracting of third-party systems). However, the most reasonable and practical solution seems to be a combination of all of these possibilities. For the purposes of a description of how these systems and tools are accessible, we use the term in-house for the systems and resources accessible through intranet or other private networks, and web-based for all others. Searching for and choosing appropriate systems and appropriate providers should be driven by enterprise LT needs, goals and objectives, and also by an enterprise competency model.

The most important element of the integrated environment for users or participants is a *single user interface* through which access to all subsystems, products, tools and resources of integrated LT environment should be possible, regardless of whether the systems are a part of the proprietary enterprise system (i.e. non-web or in-house systems) or if they are web-based. The interface should be realized in the way that the integration of all these systems and resources results to a user as a single integrated system. An important function of user interface should be personalization which is based on knowledge about user behavior and user requirements, and not only on user preferences.

Figure 2 represents a framework of an integrated LT environment infrastructure model. Conceptually, the architecture has been divided in three parts: (1) integrated LT management system (ILTMS), (2) web-based LT environment, and (3) in-house LT environment.

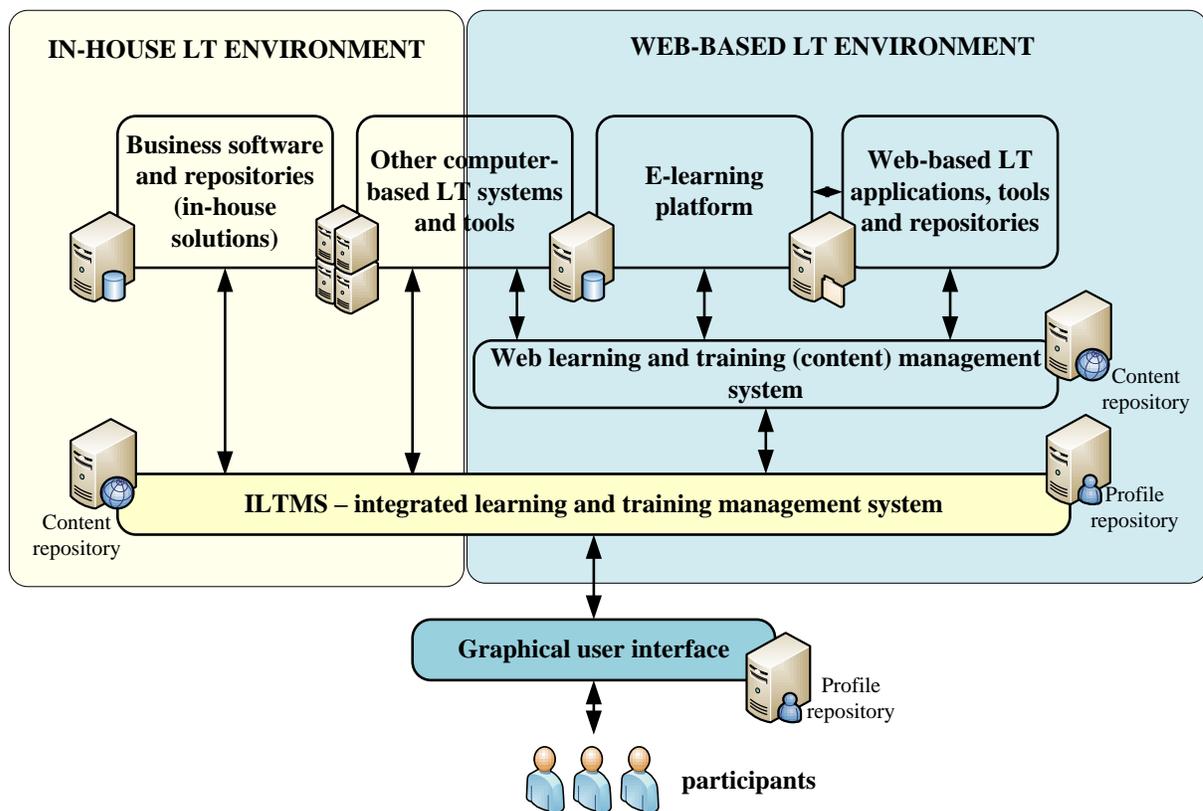


Figure 2: A framework of integrated LT environment infrastructure model

Integrated learning and training management system

The most vital part and the core component of the proposed integrated architecture is an integrated LT management system (ILTMS), supporting both environments with LT management activities. It represents a set of various software systems and tools for managing (authoring, delivering and tracking) of content, scheduling, administration, documentation and managing LT processes or activities, managing participant profiles, adaptation of individual learning plans or programs regarding assessments of performed LT activities and individual progress, and providing (standardized) training reports for individuals, groups or whole enterprise. Because ILTMS is a part of the whole enterprise information system it should be connected also with legacy (third-party) software and database or knowledge systems. Figure 3 represents the essential parts and functions of ILTMS. It should consist of content management system, authoring system, reporting and performance management system, content and profile repositories with storing and retrieving tools, and computer aided assessment system.

Through ILTMS all adaptations and personalization of user interface are possible, determination of authorized users, assignment of their roles and rights (authentication, authorization, and access management), and assignments of LT plans for individuals and for groups, as well the accomplishment of various other LT support activities. Its capability of providing competency management is, according to various authors [1], is one of the greatest advantages of ILTMS.

ILTMS should support both LT environments, in-house and web, and therefore must support management and all other functions of web contents as well. To satisfy this condition two implementations are possible: the first one is that web content management system forms an integral part of ILTMS, the second one foresees an appropriate connection and collaboration between in-house ILTMS and remote web-based LTMS.

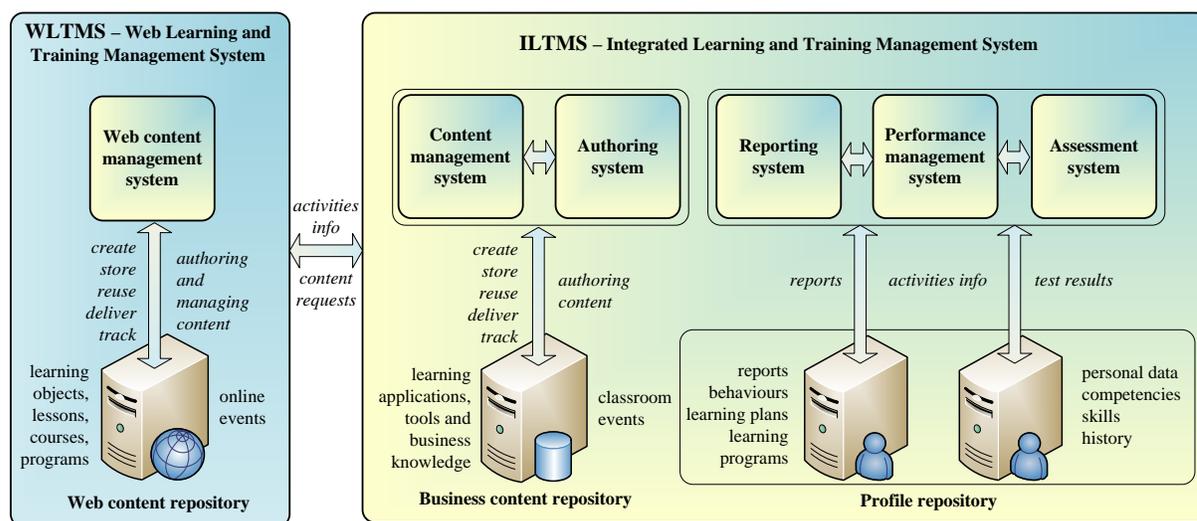


Figure 3: Content and functions of integrated LT management system

Regardless which of implementations will be chosen, the complexity of the integrated LT management system is high, so significant effort is needed for installation, configuration and later maintenance should be considered.

Web-based learning and training environment

In recent years there has been a great deal of research done on web LT and various frameworks, models, architectures, platforms, tools, and even standards for distance or web-based learning were developed [12]. Modern LT needs demand the integration of all kinds of services in one environment, frequently a web-based LT platform.

A web-based platform is an integrated web-based environment that comprises applications and tools needed for online collaborative web-based LT. Important parts of this environment are also programs that support synchronous and asynchronous communication, and collaboration. Synchronous or real-time communication is occurring at the same time for all participants (internet telephony, chat room, audio and video conferencing applications, voice e-mail, text-messaging), in asynchronous communication participants receive messages and information independently one from each other (blogs, wikis, discussion boards, e-mail, text-based computer conferencing, tools for dissemination of course content and multimedia learning materials). Collaboration is advanced, mainly real time communication of group of users who work together (whiteboard, brainstorming board, co-web browsing, application sharing, slides and multimedia creation and presentation, video conferencing). Because of the vast number of available web applications, tools and resources that can be successfully used during LT processes this set can be very populated. Nevertheless, it should be comprised of at least a distance-learning platform, web-learning tools and web content, all of them supported by LT content management and course management applications. A LT content management system provides access to learning content, performance of content creation and content manipulation. Courses and lessons management systems cover the delivery and management of participants (trainees), trainers, courses, lessons, and system modules. These two systems can be realized within ILTMS or can be parts of a web LTMS.

Other computer-based learning and training software systems and tools

Besides a classical web-based LT platform and enterprise business information system there are numerous other applications and tools we can incorporate into an enterprise leadership LT platform. They can be of direct use in LT (computer games, simulations, expert systems and neural networks, educational databases, knowledge repositories, tutorial software systems, etc.) or they only support LT activities (training dashboards, role analysis and role modeling support applications, project management software, computer-based testing systems, decision support systems, electronic performance support systems, etc.).

When preparing leadership LT plans and programs, it should be taken into consideration that for the most leadership skills are better learned experientially and independently. Some of these skills can be trained and learned exclusively during live exercises, but the live action exercise of others can be very

expensive [13], time-consuming and risky. In these cases computer games, simulations, virtual reality environments, computer-based microworlds and workbenches, expert systems, and other related computer-based software can be used very successfully. These systems and tools can be realized in-house or web-based.

CONCLUSION

This paper investigates the problem of ICT based LT of leadership skills. According to these investigations, the LT platform that supports all of the new LT approaches, such as learning by experience, learning to learn independently, and explorative learning has been proposed. The overall process of architecture design has been defined and description has been given. The proposed architecture is an integration of stand-alone and networked resources that combines all the necessary tools and services in one, integrated environment. It represents an integral part of enterprise business information system and offers a single user interface through which access to all subsystems, products, tools and resources of integrated LT environment are possible, regardless they are part of the proprietary enterprise system (i.e. non-web or in-house systems) or they are web-based. The architecture has been developed for leadership skills LT, but it is flexible and robust enough to be reused in different LT domains.

In this paper, only the first step of the whole architecture design process is presented; it is a description of the integrated architecture. The next step is the implementation of the enterprise leadership educational system, developed on the basis of the proposed architecture and appropriate standards and protocols. A prototype development lifecycle is planned for the implementation - first the basic features and systems will be implemented and tested and gradually new services and systems will be added. Finally user testing and evaluation will be performed.

References

1. Adelsberger, H.H., Collis, B. & Pawlowski, J.M. (2002). Handbook on information technologies for education and training. Springer-Verlag Berlin, Germany. ISBN 3-540-67803-4.
2. Cooper, C.L. & Locke, E.A. (2000). Industrial and Organizational Psychology. Blackwell Publisher Ltd. ISBN 0-631-20992-1. Retrieved December, 2011, from <http://www.google.com/books>.

3. Northouse, P.G. (2010). *Leadership. Theory and practice*. 5th Edition, SaGE Publications, Inc., USA. ISBN 978-1-4129-7488-2. Retrieved December, 2011, from <http://www.google.com/books>.
4. Chemers, M. (1997). *An integrative theory of leadership*. Lawrence Erlbaum Associates, Publishers. ISBN 9780805826791.
5. Ward, S. (2011a) Leadership. Retrieved December, 2011, from <http://sbinfocanada.about.com/od/leadership/g/leadership.htm>.
6. Ward, S. (2011b). 5 Keys to Business Leadership for Small Business. Retrieved December, 2011, from <http://sbinfocanada.about.com/od/smallbusinesslearning/a/leadership1.htm>
7. Stockley, D. (n.d.). Is there a difference between LT? Retrieved December, 2011, from <http://derekstockley.com.au/newsletters-06/079-training-learning.html>.
8. Yukl, G.A. (1997). "Leadership in organizations", 4th Edition, Prentice Hall, Upper Saddle Rivers, New York. ISBN 978-0138975210.
9. Yukl, G.A. (2001). "Leadership in organizations", 5th Edition, Prentice Hall, Upper Saddle Rivers, New York. ISBN 978-0130323125.
10. Collis, B. & Moonen, J. (2005). An on-going journey: technology as a learning workbench. Retrieved December, 2011.
11. Ramalingam, B. (2006). *Tools for knowledge and learning. A guide for development and humanitarian organizations*. Overseas Development Institute, London. ISBN 0 85003 8138.
12. Bouras, C., Giannaka, E. & Tsiatsos, Th. (2008). An integrated Architecture for supporting vocational training. *IGI Global*. Retrieved December, 2011, from <http://ru6.cti.gr/ru6/publications/172311.pdf>
13. Raybourn, E.M., Deagle, M.E., Mendini, K. & Heneghan, J. (2005). Adaptive Thinking & Leadership Simulation Game Training for Special Forces Officers. *Interservice/Industry Training, Simulation, and Education Conference (IITSEC)*. Retrieved December, 2011, from http://www.virtualheroes.com/pdf/AdaptiveThinkingLeadership_IITSEC_2005.pdf.

A CONCEPTUAL INTEGRATED ICT - BASED LEADERSHIP LEARNING AND TRAINING ARCHITECTURE

Arhitektura konceptualno integrisanog IKT-baziranog obučavanja i usavršavanja lidera

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Sažetak

U radu je prikazana jedna od mogućih arhitektura za obučavanje i usavršavanje rukovodilaca kompanije. Predložena arhitektura je definisana u obliku međusobno povezanih funkcionalnih blokova ili podsistema. Blok ili podsistemi su različiti alati, tehnologije i resursi koji podržavaju obučavanje rukovodilaca i procese njihovog usavršavanja. U radu je predložena integracija dva okruženja za obučavanje i trening: na mreži-baziranog i samostalnog okruženja. Rad je rezultirao u generički, konceptualni model okruženja za višekratnu upotrebu. Model definiše tehničke komponente potrebne za kompletnu IKT infrastrukturu za obučavanje i trening.

Zajedničko verovanje u svim definicijama koje se odnose na liderstvo jeste, da je rukovođenje nešto što se može naučiti, i da su u to uključene i veštine koje se mogu trenirati. Treniranje liderstva je jedan od najefikasnijih metoda razvoja liderskih veština. Najčešće korišćene tehnike obučavanja i treniranja obuhvataju: predavanja, igranje uloga (role-playing), modeliranje ponašanja, studije slučaja, igre i simulacije poslovanja, te problem-bazirano učenje i trening.

Jedan od najvažnijih koraka u toku uspostavljanja okruženja za razvoj učenja i usavršavanja u preduzeću je kreiranje arhitekture učenja i treninga. Ova arhitektura bi trebalo da sadrži raznorazne sisteme i alate, treba da bude pouzdana, robusna i dovoljno fleksibilna za buduće izmene. Za maksimiziranje efekata učenja i treninga različiti (pod)sistemi treba da budu konsolidovani, pravilno integrisani, interoperabilni i međusobno povezani korišćenjem zajedničkih standarda i protokola. Najvažniji element integrisanog okruženja za korisnike je korisnički interfejs preko koga bi moglo da se pristupa svim podsistemima, proizvodima, alatima i resursima integrisanog okruženja, bez obzira na to da li su sistemi vlasništvo

preduzeća (tj. ne-web ili "in-house" sistemi) ili su bazirani na web-u. Interfejs treba da se realizuje tako da integracija svih sistema i resursa izgleda korisniku kao jedan integrisani sistem. Najvitalniji deo i osnovna komponenta predložene integrisane arhitekture je integrisani sistem upravljanja (ILTMS - integrated learning and training management system), koji upravljačkim aktivnostima podržava oba okruženja.

Poslednjih nekoliko godina izvršeno je mnogo istraživanja u oblasti web učenja i treninga, pa su, čak, formirani i standardi za učenje na daljinu ili web učenje. Web bazirane platforme pored najrazličitijih web alata omogućavaju sinhronu komunikaciju, u realnom vremenu (Internet telefonija, čet, audio i video konferencije itd.), ali i asinhronu komunikaciju (blogovi, wiki, e-mejl...). Web-platforma treba da se sastoji najmanje od platforme za učenje na daljinu, web alata za učenje i web sadržaja.

Osim klasične web-bazirane platforme i poslovnog informacionog sistem preduzeća, postoje brojne aplikacije i alati koji se mogu uključiti. Oni se mogu direktno koristiti za učenje i trening (kompjuterske igrice, simulacije, ekspertski sistemi i neuronske mreže, obrazovne baze podataka, tutorijali, itd.) ili samo za podršku učenju i treningu (trening table, aplikacije za podršku analiza, softver za upravljanje projektima, računarski sistemi za testiranje, sistemi za podršku odlučivanju, itd.).

U radu su kroz tri šematski prikazane konfiguracije prikazani: okvirni proces kreiranja arhitekture za učenje i trening, okvir infrastrukture modela i sadržaj i funkcije integrisanog sistema. Predložena arhitektura predstavlja integraciju jednokorisničkih i mrežnih resursa i kombinuje neophodne alate i servise u integrisano okruženje. Ona predstavlja integralni deo poslovnog informacionog sistema preduzeća i nudi korisnički interfejs preko koga se omogućava pristup svim podsistemima, proizvodima, alatima i resursima integrisanog sistema učenja i treninga, bez obzira na to da li su vlasnički sistemi preduzeća ili su web-bazirani.

Ovaj rad predstavlja prvi korak procesa kreiranja arhitekture sistema - opis integrisane arhitekture. Sledeći koraci će biti implementacija predložene arhitekture kroz izradu prototipa, testiranje i evaluaciju ostvarenog rešenja.

Ključne reči: arhitekture za učenje i trening, na računaru zasnovano učenje i trening, e-učenje, učenje na daljinu