The Four Elements of a viable PLE

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ABSTRACT
In this paper, we propose and discuss four fitness features considered as essential for developing personal learning environments (PLE) that are viable and ready for appropriation.

Categories and Subject Descriptors
K. **[Computing Milieux]**: K.3. Computer and Education, K.4 Computers and Society- *miscenallenous*.

General Terms
Design, Human Factors

Keywords
Personal Learning Environments, lifelong learning, knowledge management, social media

1. INTRODUCTION
Rather than being confined to earlier life stages and strictly acquired within standard educational systems, learning should be *actively* pursued during the lifetime period. "Lifelong, lifewide, voluntary, and self-motivated" learning [1] refers to the activities that people conduct during their lifetime, to develop knowledge and competences, motivated by personal, social as well as employment reasons [2,3]. Lifelong learning is about learning anything, anywhere, anytime and anyway. It encompasses formal, non-formal and informal learning. Formal learning refers to intentional learning that occurs in structured contexts, and often leads to a formal recognition (e.g. diploma, certificate). Non-formal and informal learning, on the other hand, take place in environments that are neither essentially learning-oriented, nor structured in terms of learning objectives, material, time, or support [4]. Different from non-formal learning, informal learning is accidental or spontaneous, and occurs over the lifetime period [5,6].

Traditional LMS (Learning Management Systems) are not suitable for lifelong learning. LMS systems are usually characterized by a hardcoded asymmetry in user rights [7]. Students usually have single predetermined roles, share the same homogenous learning context, and are expected to achieve the same learning goals within the same period. Moreover, learning content is pre-packaged in learning units, has a restricted visibility scope (usually limited to the course duration), and is isolated from the outside world. Sometimes, courses cannot even be shared within the same LMS.

To better address the requirements of lifelong learning, educational systems need to become part of an external system accounting for learning inside and outside formal academic environments [8]. There is a need to shift from traditional LMS *applications* particularly focused on formal interactions and learning, to online personal learning *environments* (PLE) supporting both institutional and self-directed, intended and accidental learning. Successfully sustaining lifelong learning with online PLE requires developing and adopting new design patterns, models, and prototypes that can substitute for prevalent LMS design patterns [9]. In this paper, we discuss four elements deemed important for ensuring an online PLE's fitness for adoption and lifelong survival.

2. THE FOUR PLE ELEMENTS
This paper is based on the following definition of online PLEs: online PLEs are environments that are built from the perspective of the *individual* rather than the *institution* [10] and give learners the opportunity to decide their own learning goals, control their learning spaces [11] and interact with each other during the learning process [12]. The four identified features for building successful PLE are described below.

2.1 Encouraging active participation by adopting social media paradigms
The problem of low participation and lack of personal incentives was a major issue in early collaborative applications [13]. By adopting a user-centered bottom-up philosophy and relying on Web 2.0 technologies, social media applications have successfully overcome several problems identified by earlier CSCW studies, achieving by that a higher acceptability and a better user experience than traditional groupware. Online PLE should embrace the social media practices of knowledge "democratization" encouraging active participation and facilitating information dissemination as well as social interactions.

First, having low learning curves and offering interactive user-friendly interfaces is crucial for achieving fitness. With respect to developing interactive interfaces and improving the

user experience, Web 2.0 technologies such as AJAX[1] play a particularly important role if applied properly [14].

Second, PLE should encourage learner-generated content by providing easy individual and collaborative authoring features such as blogs and wikis. Learner-generated metadata can be achieved by offering social tagging. The term folksonomy denotes the Web 2.0 way of organizing content using tags created and shared by people [15].

Third, PLE should combine content management facilities with social networking features allowing people to explicitly build and publish their own network of connections. People achieve lifelong learning by creating, maintaining, extending and strengthening their personal network composed of people with similar interest, groups, systems and specialized information sets [16].

Fourth, PLE should incorporate SALT features. SALT (Share, Assess, Link, Tag) is an acronym introduced in [17] to account for social media features that facilitate information dissemination and trigger interactions and reflection on knowledge artefacts. Assessment includes liking/disliking, commenting, and rating. Giving users the opportunity to easily contribute and express their views leads to a better appropriation of the online platform and increases their motivation to collaborate with others. Creating links (or bookmarks) to people and content and sharing them allows discovering the connections between different items, and discovering new items through their connections with known ones. Tagging can be used for describing an item or categorizing it using a user-defined label. Additionally, using tag-based search and tag clouds, learners can discover communities, activities, and artefacts that are relevant to specific topics of interest. Tagging people have also proven to be useful in formal contexts [18]. Influenced by users' tagging practices in collaborative tagging systems, tag semantics can emerge and evolve [19]. This helps communities to incrementally build a common vocabulary and externalize their shared memory. A direct advantage of incorporating these social media features is generating unobtrusive relation-based recommendations whereby metadata resulting from *SALT* actions are exploited in order to bring to the surface relevant people, activities, and knowledge artefacts based on how and by whom they have been *"salted"*.

2.2 Representing interaction and learning contexts in a flexible way

Ackerman identifies the necessity of providing flexible, nuanced and contextualized CSCW (Computer-Supported Collaborative Work) apparatus just as human behavior is "flexible, nuanced and contextualized" [20]. This statement perfectly applies to PLE that should be designed in a flexible and bottom-up way and account for **heterogeneous interaction and learning contexts**, including work, formal learning, and even play [21].

Learners should be given the opportunity to design and manage their own learning "**contexts**" by mashing up application widgets and useful artefacts, then sharing them with different people in different contexts. At the same time, it should not be imposed on learners to explicitly specify their interaction and learning contexts. PLE should allow different ways of context identification, ranging from those explicitly delimited by learners to those implied from their personal and collaborative actions. On the one hand, a community space constitutes an **explicit** context for potential interactions and learning revolving around the community's practices and involving its members, its shared artefacts, as well as its eventual sub-activity spaces. On the other hand, two or more actors commenting the same asset could also form an implicit interaction context involving them, the asset in question, its owner, and other contributors. Identifying interaction and learning contexts is crucial in PLE and is indeed more challenging than in traditional LMS. This is mainly because PLE are not confined to preplanned collaborative scenarios occurring within rigid and closed collaboration spaces. Instead, it also accounts for smoother forms of interactions that can **evolve** over time and induce both intended and unintended learning situations.

2.3 Offering elastic community and content management services

Communities of practice (CoPs) are defined as a group of individuals who choose to collaborate on a regular basis in order to learn and improve their practices related to a shared passion or topic of interest [22]. CoPs are considered to play a key role in fostering knowledge sharing and learning [23]. This triggers the motivation to sustain the initiation and evolution of CoPs in professional and educational environments [24]. When it comes to groupware systems, **flexibility** is a critical usability factor and their design should take into account the possibility for groups to evolve over time in terms of behavior, nature, and composition [25]. The same should apply for the support of community building and evolution in a PLE. Users enter their PLE as individual actors and not as pre-labeled members of a rigid organizational or institutional structure. Then, they can create their self-organized **communities** [26] or deliberately join existing ones, some of which may correspond to institutions and organizations. With respect to rights managements, there ought to be no pre-assumed hierarchy or default distribution of rights; a person can be a learner in one community and a moderator in another.

With respect to **content management,** learners should be able to create, share, modify, annotate, review and most importantly *repurpose* learning artefacts ranging from books to Weblogs, videos, podcasts and discussion archives [27]. Bringing together heterogeneous information sources requires adopting lightweight specifications such as RSS (Real Simple Syndication or Rich Site Summary) [28] and creative commons[2] licenses rather than strictly adhering to educational standards (i.e. IMS[3], SCORM[4]). Unlike traditional LMS where knowledge objects are organized within learning units and their usage anticipated, in a PLE, artefacts can exist outside the scope of activity spaces; they can be shared directly among actors without having to belong to an activity space or fall under the

[1]AJAX (Asynchronous JavaScript and XML) combined technologies exchange data asynchronously with the server to respond to a user's request. This avoids freezing the current

[2] http://creativecommons.org

[3] http://www.imsglobal.org

[4]http://en.wikipedia.org/wiki/Sharable_Content_Object_Reference_Model

umbrella of reaching an explicitly stated objective. Indeed, they can at any time be posted in one or more activity spaces, grouped together in a bottom-up way using tags, or explicitly related to other artefacts. This approach increases the learning flexibility and encourages the *spontaneous appropriation* of knowledge artefacts.

2.4 Providing personalized and contextual recommendation services

PLE can be classified as "open corpus" environments [29]. In a PLE, relationships between knowledge artefacts are not necessarily known beforehand, as it is the case in traditional hypermedia systems; instead, they can emerge, evolve, and expand during run time. In addition, in online platforms where everyone is a "consumer" and a "producer", contributions differ in quality, style, subject matter, target audience, composition, and reliability. In such open environments, personalized and contextualized recommendations can drive learners' attention to potentially interesting resources depending on their implicit or explicit interests, therefore avoiding information overload, and triggering formal and informal learning opportunities [30,31]. As mentioned earlier, PLE-embedded recommender systems can exploit SALT actions performed by users on knowledge artefacts and in different contexts in order to unobtrusively leverage user interest [32].

3. CONCLUSION

This paper discussed four main factors deemed crucial for developing PLE that are fit, ready for appropriation, and capable of evolving over time: the adoption of social media paradigms, the flexible representation of interaction and learning contexts (including those explicitly defined by learners and those implied from their actions), the incorporation of elastic community and content management features encouraging the spontaneous appropriation of knowledge objects, and finally the delivery of personalized and contextualized recommendation services. We are currently working on Graaasp[5], an online PLE that builds on the four PLE elements discussed in this paper.

4. REFERENCES

[1] Government of Ireland Stationery Office. (2000). *Learning for Life: White Paper on Adult Education.* Dublin.

[2] Aspin, D., & Chapman, J. (2007). Lifelong Learning: Concepts and Conceptions. In D. Aspin (Ed.), *Philosophical Perspectives on Lifelong Learning.* Dordrecht: Springer.

[3] Griffin, C. (1999). Lifelong Learning and Social Democracy. *International Journal of Lifelong Education , 18* (5), 329-342.

[4] Colardyn, D., & Bjornavold, I. (2004). Validation of formal, non-formal and informal learning: policy and practices in EU Member States. *European Journal of Education , 39* (1), 70-88.

[5] Cross, J. (2006). Informal Learning: Rediscovering the Natural Pathways that Inspire Innovation and Performance. New Jersey: John Wiley and Sons.

[6] Faure, E., Herrera, F., Kaddoura, A. R., Lopes, H., Petrovski, A. V., Rahnema, M., et al. (1972). *Learning to Be.* Paris: Unesco.

[7] Wilson, S., Liber, P. O., Johnson, M., Beauvoir, P., & Sharples, P. (2007). Personal Learning Environments: Challenging the dominant design of educational systems. *Journal of e-Learning and Knowledge Society , 3* (2), 27-28. Retrieved 2010 20-January from http://je-lks.maieutiche.economia.unitn.it/index.php/Je-LKS_EN/article/viewFile/247/229

[8] Taylor, F. P. (2004). Education technology helps unite school communities, improve academic achievements. *T.H.E. Journal , 31* (10), 46–48.

[9] Downes, S. (2010). New Technology Supporting Informal Learning. *Journal of Emerging Technologies in Web Intelligence , 2* (1), 7.

[10] Atwell, G. (2006 1-June). *Wales Wide Web.* Retrieved 2010 1-May from Personal Learning Environments: http://www.knownet.com/writing/weblogs/Graham_Attwell/weblog.archives/2006/6

[11] Naeve, A., Nilsson, M., Palmér, M., & Paulsson, F. (2005). Contributions to a public e-learning platform: infrastructure; architecture; frameworks; tools. *International Journal of Learning Technologies , 1* (3).

[12] Van Harmelan, M. (2006). Personal Learning Environments. *Proceedings of the 6th IEEE international conference on Advanced learning technologies* (pp. 815-816). Washington D.C.: IEEE Computer Society.

[13] Grudin, J. (1988). Why CSCW applications fail: problems in the design and evaluation of organizational interfaces. Proceedings of the 1988 ACM conference on Computer-supported cooperative work (pp. 85-93). New York: ACM.

[14] Garrett, J. J. (2005 2-18). *Ajax: A New Approach to Web Applications.* Retrieved 2010 20-06 from AdaptivePath.com: http://www.adaptivepath.com/ideas/essays/archives/000385.php

[15] Liccardi, I., Ounnas, A., Pau, R., Massey, E., Kinnunen, P., Lewthwaite, S., et al. (2007). The role of social networks in students' learning experiences. *ACM SIGCSE Bulletin , 39* (4), 224-237.

[16] Siemens, G. (2004 12-December). *Connectivism, A Learning Theory for the Digital Age.* Retrieved 2010 30-June from elearn space: http://www.elearnspace.org/Articles/connectivism.htm

[17] El Helou, S., Li, N., & Gillet, D. (2010). The 3A Interaction Model: Towards Bridging the Gap between Formal and Informal Learning. *International Conference on Advances in Computer-Human Interaction (*pp. 179-184). Washington D.C.: IEEE Computer Society.

[18] Farrell, S., Lau, T., Nusser, S., Wilcox, E., & Muller, M. (2007). Socially augmenting employee profiles with people-tagging. *The 20th annual ACM symposium on User interface software and technology* (pp. 91-100). New York: ACM.

[19] Körner, C., Benz, D., Hotho, A., Strohmaier, M., Stumme, G. (2010). Stop thinking, start tagging: tag semantics

[5] http://graaasp.epfl.ch

emerge from collaborative verbosity. *Proceedings of the 19th international conference on World Wide Web*.

[20] Ackerman, M. (2001). The Intellectual Challenge of CSCW: The Gap Between Social Requirements and Technical Feasibility. In J. Carrol (Ed.), *HCI in the New Millennium.* New York: Addison-Wesley.

[21] Twidale, M. B., Wang, X. C., & Hinn, D. M. (2005). CSC: computer supported collaborative work, learning, and play. *Proceedings of the 2005 conference on Computer support for collaborative learning* (pp. 687-696). International Society of the Learning Sciences.

[22] Wenger, E. (1998). *Communities of practice: learning, meaning, identity.* Cambridge, UK: Cambridge University Press.

[23] LaContora, J., & Mendonca, D. (2003). Communities of practice as learning and performance support systems. *Information Technology: Research and Education, 2003* (pp. 395 - 398). Washington D.C.: IEEE Computer Society.

[24] Stanoevska-Slabeva, K., & Schmid, B. (2000 4-January). A generic architecture of community supporting platforms based on the concept of media. *Proceedings of the 33rd Hawaii international conference on System sciences-Volume 1*(p. 1014). Washington D.C.:IEEE Computer Society.

[25] Dourish, P. (1992). *Applying Reflection to CSCW Design*. Position paper presented at Workshop on "Reflection and Metalevel Architecture" European Conference on Object-Oriented Programming. Utrecht, Netherlands.

[26] Rocha, L. M. (1998). Selected Self-Organization And the Semiotics of Evolutionary Systems. In S. Salthe, G. G. Van de Vijver, & M. Delpos (Eds.), *Evolutionary Systems: The Biological and Epistemological Perspectives on Selection and Self- Organization* (pp. 341-358). Kluwer Academic Publishers.

[27] Downes, S. (2007). Learning Networks in Practice. (D. Ley, Ed.) *Emerging Technologies for Learning , 2*, 19-28.

[28] Pilgrim, M. (2002 18-December). *What is RSS?* Retrieved 2010 30-June from XML: http://www.xml.com/pub/a/2002/12/18/dive-into-xml.html

[29] Brusilovsky, P., & Henze, N. (2007). Open Corpus Adaptive Educational Hypermedia. *The adaptive web: methods and strategies of web personalization* , 671-696.

[30] Koper, R., & Tattersall, C. (2004). New directions for lifelong learning using network technologies. *British Journal of Educational Technology , 35* (6), 689-700.

[31] Tang, T., & McCalla, G. (2009). A Multidimensional Paper Recommender: Experiments and Evaluations. *Internet Computing, IEEE , 13* (4), 34-41.

[32] El Helou, S., Gillet, D., & Salzmann, C. (2010). The 3A Ranking System: Contextual, Personalized & Simultaneous Recommendation of Actors, Activities & Assets . Journal of Universal Computer Science, on Context-aware Recommender Systems, In press