

Developing the Architecture of a Large-Scale Informal E-Learning Network

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Abstract—This paper reviews the architectural design of an e-learning network (Nonprofit e-Learning Network) designed specifically for the broad Voluntary and Community Sector (VCS). The project is aimed at the majority of the VCS who, because of cost or time concerns, or for other reasons, make little or no use of traditional formal approaches to learning or even access short training courses. The central educational philosophy of the network is based on informal learning, but as the design proceeded it became clear that formal learning would need to be combined with less formal elements. This led to the development of an architecture based around three “zones” covering a range of informal and formal learning approaches.

Index Terms—Charity sector; communities of practice; informal learning; learning architecture; learning design; lifelong learning.

I. CONTEXT AND BACKGROUND

This paper starts from the City of London, whose one square mile employs about a quarter of a million people, and is the world’s leading international financial centre. Historically it was also the physical home of the guilds of London, known as livery companies. These guilds have always had a very strong charity and educational element alongside their professional concerns.

The eLearning project discussed below is concerned with the charity rather than the financial world. The UK government believes that it is important to build up a stronger charity sector, in part to enable more public services to be run other than by the public sector. But in recognition that many charities, especially small to medium sized ones, have not historically had strong management capability, the BASIS (Building and Sustaining Infrastructure Services) program has been set up to improve the capability of the sector [1].

A group from the Centre for Charity Effectiveness worked up the initial idea for the network in 2004-5. An initial set of seedcorn funding enabled this idea to be developed sufficiently to produce a business plan – a proposal to an unknown funder. When the BASIS program was announced, an outline proposal was submitted, and was short-listed, for which a second round of seedcorn funding was received to develop a working prototype and a full business plan. The project bid was successful and the 2.7m euros project got the go-ahead in January 2008. It is entitled the Nonprofit e-Learning Network (NPeLN).

In the very same week, the minister responsible for adult education launched a new initiative to promote adult informal learning in England, placing this project even further centre stage of national policy. [2]

II. INTRODUCTION

The UK charity sector has a significant and persistent “learning deficit” – less than a third of the spending per employee on staff training and development compared to public and private sector organizations. Yet at the same time the government is expecting the sector to take an increasing responsibility for the operation of non-profit activity, e.g. in social care. This paper reports on a project which aimed to reduce the learning deficit, using a large scale entirely electronic-based learning network. The aim in this paper is to highlight key dimensions of the architectural design of the project [3]. This has a particular emphasis on the management development needs of “hard-to-reach” groups, and particularly involving communities of practice [4]. The decisions affecting the architecture discussed here were taken in the context of this particular sector, but characteristics such as some participants being hard to reach, and the recognition of a learning deficit, would also be found in other sectors. Therefore this learning network is of particular interest as a case study of applying informal learning principles to material that can be delivered electronically.

The learning deficit is particularly noticeable in the managerial area. In professional areas e.g. of social care, there are professional qualifications and compulsory professional development. There are typically no or few such requirements for those in management

The prototyping element was of most profound significance, especially as it was embedded into the process from the very start and could be regarded as a way to build informal learning into the development of the project. We proposed that it was not only desirable but essential to use prototyping with real end users in the main project if funded. Indeed one of the deep ironies of this project, which is totally geared to fully electronic delivery of learning, is the strong belief in the importance of physical contact that is part of its outreach. Such outreach proved essential, not least as the participants at the regional prototype events in 2007 themselves strongly recommended it [5]. During the prototyping stage significant factors, notably some participants’ reluctance to provide user-generated content, and the demand for accredited qualifications emerged.

The consortium found that, regardless of whether it was face to face or distance learning, there was very unlikely to be significantly increased take-up of formal learning for several reasons:

- Cost, both financial and time
- Commitment, particularly of time, over a sustained period to complete a qualification

- The granularity of the need may be small e.g. the answer to a quick question does not necessitate a three year, three month or even three hour formal learning program
- Lack of appeal of formal learning e.g. to hard-to-reach groups

In relation to the content of management as a subject of study, the areas identified in the market research [5] included:

- planning and managing work
- financial management
- how to increase resources and fundraising
- human resources
- governance
- lobbying
- volunteering
- problem-solving
- decision-making

The UK has seen a wide range of unsuccessful experiments in novel, risky educational technology, culminating in the hugely expensive UkeU (UK E University) [6]. An important early decision taken was to focus on architecture and processes that could be created using available existing systems, and not to develop an expensive custom technological solution.

Goodyear’s [7] work on eLearning continues to provide one of the most relevant frameworks for such planning. Its central message is that eLearning is just one component in the whole organization of teaching and learning that cannot be treated in isolation from those other factors. Nor will eLearning necessarily have any beneficial effect unless deployed in synchronization with the other factors.

Following Goodyear’s influence, much of this paper is concerned with pedagogic strategy and tactics, ahead of some later discussion on technology. In relation to Goodyear, the pedagogic philosophy of the project is constructivist; Goodyear particularly contrasts constructivist with transmissive learning (Figure 1, [7]). The high level pedagogy is informal learning, based on user-generated content, and the tactics involve a wide range of components articulated below.

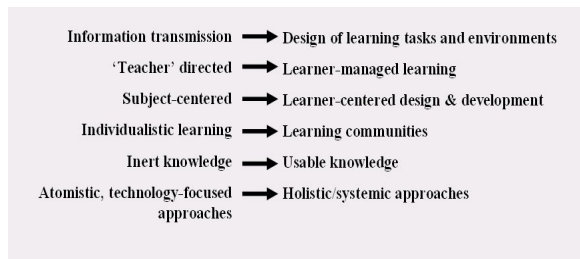


Figure 1. Transmissive/Constructivist

III. LEARNING ARCHITECTURE

Formal learning takes places within the context of a designed and organized education system, which is usually regulated in a variety of ways. It involves institutions, courses, curricula, modules, cohorts, and certification. Informal learning is community or work based, driven by needs and interests, with no certification, no pre-requisites and unregulated.

It is well understood that a vast amount of informal learning takes place daily, e.g. via web searches and online resources such as wikipedia [8]. The problem there is with the sheer quantity of material, its often geographically limited value (e.g. quite different legislative and cultural frameworks in the USA and UK) and also its variable quality. It was clear, nevertheless, that more efficient and effective use of informal learning resources [9] including critical thinking about the material, would aid the everyday learning of those working in the third sector.

The EC [10] defines informal learning as ‘a natural accompaniment to everyday life’ If formal learning and informal learning occupy two ends of a spectrum, then there is a middle ground potentially available. In the EC definition, we would regard this middle ground as informal learning since it does not involve classes, cohorts, qualifications, curriculum or assessments, and where it has some degree of structuring, this is not by and large of a top-down hierarchical nature. Informal learning includes a wide variety of methods, but it is particularly well suited to the use of the internet, and even more specifically, to the use of Web 2.0 tools and technologies. These tools particularly emphasize user-generated content rather than, as in conventional e-learning, expert-generated content.

What it lacks in terms of top-down structure, it makes up for by the nature and energy of its bottom-up communities. Self-organizing communities of practice are one of the key vehicles of informal learning, especially in an environment where this is combined with some structured pedagogic organization. Members of such communities include those with expertise (they might not be comfortable with the term “experts”), and they include those who are novices.

Communities of practice predate the internet. This is the area of the club and society, of the association and co-operative. With the growth of electronic networks, such as the Well and Usenet, came the first online communities of practice. With web 1.0 and now web 2.0 these have grown exponentially, to the point in fact where it is difficult if not impossible to track down all the key relevant communities of practice.

Online communities are glued together by any number of online collaborative tools, including discussion boards, blogs, wikis, instant messaging, online conferencing, webcasts, webinars, social networking applications etc. They carry overheads, above all the time of volunteers needed for essential tasks such as setting up the community and then moderating it and excluding undesirable external material, as well as that internally generated which breaches the etiquette of the community. Some virtual communities develop at least a fleeting physical presence, such as a meeting annually, while others link up with some cognate physical event, such as a conference well-known in the community. There may also be special online events, such as large-scale jams [11].

Most informal learning will proceed without any top-down influence whatsoever, and indeed the volunteer spirit of the community might well be harmed as a result of top-down intervention. But the major disadvantage of the bottom-up community is that it will only cover what its current members want it to cover, and which its current members are able to cover.

It is noticeable that wikipedia and its various offshoots such as wikiversity have been very successful in creating

valuable encyclopedia entries on sport and popular music. They have had nothing like the same success in the area of management.

One potentially valuable route to filling the gap has been the development of Open Educational Resources [12](OER) e.g. from MIT [13] (largely course handbooks) and the UK Open University (largely paper-based course units published in html) [14]. However these initiatives focus on providing content, and for the charity sector which has a very specific set of requirements, the subjects of interest do not necessarily match those offered by such resources. Furthermore the NPeLN set out to develop an architecture to support learning, not merely to provide content.

Informal learning fundamentally requires a bottom up, non-hierarchical approach to learning [3]. So is it possible, or even desirable, to apply methods which have evolved in a formal learning context to the promotion of informal learning? Or should informal learning be promoted and shaped by an entirely different set of values than formal learning? According to [15] “*learners who are not engaged with educational institutions are not likely to be attracted by institutional systems*”

NESTA Futurelab [16] argues that “*The logic of education systems should be reversed so that the system conforms to the learner, rather than the learner to the system.*” . But the NPeLN is being developed by a conventional university, and traditional universities have a long tradition of requiring learners to conform to the system.

Ivan Illich [17] argued over 35 years ago that informal learning required four components, which uncannily pre-figured what is now perfectly feasible using Web 2.0 tools in particular:

1.) *Reference Services to Educational Objects*—which facilitate access to things or processes used for formal learning.....

2.) *Skill Exchanges*—which permit persons to list their skills, the conditions under which they are willing to serve as models for others who want to learn these skills, and the addresses at which they can be reached.

3.) *Peer Matching*—a communication network which permits persons to describe the learning activity in which they wish to engage, in the hope of finding a partner for the inquiry.

4.) *Reference Services to Educators-at-large*—who can be listed in a directory giving the addresses and self-descriptions of professionals, para-professionals, and free-lancers, along with conditions of access to their services. Such educators, as we will see, could be chosen by polling or consulting their former clients.

Scott Wilson [18] has proposed a “Personal Learning Environment” (PLE), as outlined in Figure 3 which would offer, in particular, the peer matching and reference services that were proposed by Illich. While the NPeLN is not a PLE, we would encourage participants to create their own PLE, for example by creating their own links to content hosted elsewhere, such as E-portfolios or pictures on Flickr. An important principle here is that the NPeLN should be extensible beyond material held on the central platform used for the network. It is possible to overestimate how broad a range of people wish at moment to be active creators. During the prototyping period, one of the

most frequently asked questions was whether users would be “forced to use blogs and Facebook?”.

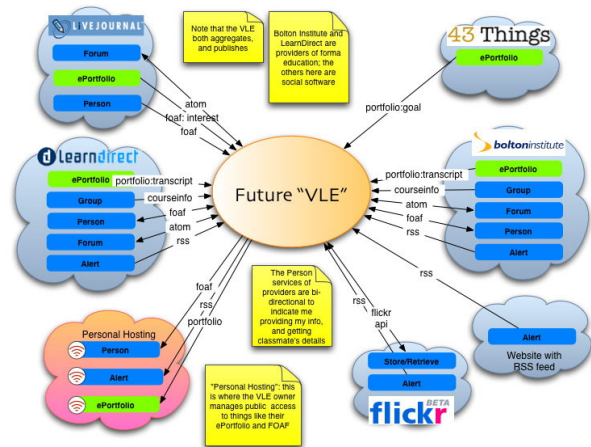


Figure 2. Personal learning environment

The NPeLN developed a number of principles which underlay the high level architecture design. Firstly, though there would be some provision of content by experts, the dominant approach would be to promote user-generated content. This is creatable through communities of practice. It is also important to have a just-in-time dimension, so queries could be posted with a reasonable expectation that an answer would be generated within a specified period of time.

IV. DESIGN: THREE ZONES

The result of the above analysis led to an architecture of the NPeLN around three “Zones”. In practice zones 1 and 2 would typically comprise informal learning, and zone 3 would comprise formal learning.

Zone 1—“*Information*” relates to learning where users operate within their own schedule and time. This zone is fully open, requiring no registration. The Zone provides access to a substantial range of generic materials accessible through a logical structure which makes it easy for users to find materials in key subject areas (e.g. fund-raising, strategy, managing volunteers etc). Materials are mainly via electronic links to other free services and providers. In this Zone, users thus gain access to materials through the portal itself, but also access other organizations web sites’ materials. A fundamental aspect of the NPeLN in this area is providing resources to improve the searching and reviewing skills of learners.

Zone 2 – “*Problem solving*” requires users to register (free) and learning, though predominantly informal, is supported by some structured elements (i.e. there will be some organization of events and interactions). Users access material in a range of ways including through 20-30 Special Interest Groups (SIGs), which are primarily subject-led (e.g. fund-raising, governance, strategy, project management etc). SIG leaders stimulates users to join SIGs and be active in generating, modifying and commenting on materials produced and would promote the work of the SIG. SIGs typically generate newsletters, noticeboards, knowledge banks, podcasts, surveys and organize e-events and webinars. In these ways, users of Zone 2 will be ‘active in their own learning’. The exact

boundary between Zone 1 and 2 evolves in the light of usership/practice

In a formal learning system, the facilitators can rely to at least some extent on extrinsic motivational factors. But in a wholly or substantially informal network, quite different considerations are likely to apply. A great deal of effort has gone into reviewing alternative ways through which engagement with users can take place, above and beyond the everyday practical reality of reading and making contributions and interactivity.

One route which has been receiving considerable attention is the use of games, including serious games, or alternate reality.

Zone 3 – “Study” provides formal learning organized through academic courses with short and long courses and other education and training providers, combining conventional learning with e-learning through e-teaching, coaching and mentoring. Generally, courses are charged and may be designed for specific VCS organizations, both frontline and infrastructure.

V. TECHNICAL ARCHITECTURE

There have been a number of key areas in relation to technology which have led to the final shaping of the technical architecture.

The project was originally conceived in 2004/5, before the term Web 2.0 had been identified. It will not be completed until the summer of 2011, the technologies of which cannot be accurately predicted. So a crucial dimension of the project architecture is between flexibility to allow for unknown future developments, and relatively stable “core” components which will vary little if at all over the project lifetime.

Key decisions were needed on the balance between open source and proprietary technology. The core values and core proposal meant there would be a dominance of open source technology used, not least because the sector is already an active user of open source, as well as the values of open source, including volunteering, being very well aligned with that of the sector as a whole. However it was recognized that at the margin it was necessary, and possibly even desirable, to use proprietary technology for either pragmatic reasons (already available) or because of the importance of reliability.

#1: Information Generic, existing resources; no membership		#2: Problem-Solving Expert and member- generated material and communities		#3: Study Specific to cohorts and high interaction with experts	
Process	Content	Process	Content	Process	Content
Navigation	Public web	Organise	New expert content	Long courses	Advanced diagnostics
Portal	Search Engines	Structure	User-generated content	Short courses	e- teaching
Training/ Awareness	Wikipedia	Stimulate	Basic diagnostics	Tutoring	e-coaching
Confidence	Blogs	Catalyse	Topic wikis	Research Supervision	e-mentoring
Judgement in value and validity	Digitised books	Promote	Newsletter Noticeboard		Custom blogs
	E-news	Enthuse	Surveys		Custom wikis
	Open Courseware	Human network	Knowledge bank		
	Online discussions	Editors	Podcasts		
		Mentors	E-events Webinars		

Figure 3. Zones of learning

The “Make or Buy” decision has been a perennial one through the history of IT. These days the “buy” part may involve tens of pounds rather than tens of thousands, e.g. for a license to use web-based applications. The “make” part also could involve initiating a plug-in or module already present in an open source menu.

Another key decision concerned scalability. The project necessarily would start very small, but over the project life would grow to over ten thousand users. To achieve this it would be necessary to accommodate a wide range of levels of expertise within the network, satisfying both very technology literate early adopters, and those who might initially be wholly unfamiliar with technology.

While the former group was important in the initial perception of the NPeLN, it was the latter who were the ultimate core group, Therefore it was vital that the user interface and navigation fully met the needs and constraints of the latter group, and this was a prerequisite for building a large and cohesive community of users.

Rapid potential growth is supported by an architecture which allows for flexible processes, and also which supports a range of learning approaches and types of content.

In relation to the development process, even at the bidding stage there was a heavy emphasis placed on prototyping, including four events with very diverse audiences in the inner city, a poor rural area, with recent immigrants and with a group of blind people.

The network had to be initiated in a top-down way to get it started, but the aim from the very start was to ensure that it was as configurable and adaptable as possible by some or all of the participants themselves. The consortium had noted another learning network where it was not possible for example, for participants themselves to initiate a new thread in a discussion board, this only being possible by a moderator.

Despite the above design decisions appearing to be largely technical in nature, it emerged that almost all of them had significant impacts on the wider perception of the project, and therefore the decisions on them were taken at the highest strategic level in the project, also taking into account impacts and risks in relation to project learning outcomes.

The prototype had been developed using an open-source content management system, PLONE. Aspineli has studied the Plone open source community [19] in depth. The growth of this and other similar open source software communities prefigures the type of open source content community we are seeking to develop ourselves, and this was an important reason for choosing Plone. Furthermore, we felt that joining this mature open-source community offered some valuable opportunities for adding new functions and processes. It was necessary to re-visit the software architecture at the start of the project.

The starting point was the conception of the network, in effect its persona, which was worked up by the Project Board as a key input to the architecture review. What dominated the minds of all concerned was that although the key target group, the hard-to reach, generally had increasing IT skills, they were significantly less digitally literate than the average current users of blogs, discussion boards and wikis. It was therefore felt since these were the primary audience, the single most important issue was not to deploy cutting-edge, best of breed applications, but rather to put the highest priority on a high-quality, consis-

tent interface with ready interoperability between application areas as vital. As a result of this strategic perspective, the use of Plone to provide the central spine of the architecture was confirmed, and the synergies between the open-source community supporting Plone and the community using NPeLN should support this..

VI. CONCLUSION

One question that came up repeatedly at the prototype events was “are we going to be able to get any qualifications from this?” Given the whole priority towards informal learning, the initial reaction of the Project Board was that accreditation was not a key issue. But as this has been considered further, it is perhaps important that informal learning is seen as a valid route towards a qualification. There is a growing body of work in the UK [20], [21] which promotes APEL (the accreditation of prior experiential learning).

Although there was initial consideration of creating a wholly informal learning network, it eventually proved necessary to think in terms of three zones of learning, two largely corresponding to informal learning and one mostly to formal. The zone requiring the most significant relates to problem solving, based primarily on communities of practice. The primary task in the information zone relates to improving learners’ skills in accessing and interpreting generic materials.

There have also been a number of key technology architecture decisions. Although this is a learning network, it is arguably is not an “eLearning network” along a conventional formal, content focus. Nor is it a personalized learning environment, since that has to be constructed by the individuals themselves. The emphasis rather is on providing connectivity from peer to peer and large groups to peers. This enables participants to make their own contributions to the body of learning material, to review others’ contributions, to build connections within the content supported by the network, and to facilitate the creation of links with external content. There continues to be a need for a widespread discussion of architectural dimensions of network design, including the roles of open source and open educational resources [22].

REFERENCES

- [1] Big Lottery Fund (2007) “Consultation on BASIS round two: Big Lottery Fund response to the consultation” Big Lottery Fund, London
- [2] DIUS (2008) Informal Learning, Press Release, DIUS, London
- [3] Centre for Charity Effectiveness (2007) “NpeLN Business Plan”, CCE, Cass Business School, London
- [4] White, Nancy (2002) “Networks, Groups and Catalysts: The Sweet Spot for Forming Online Learning Communities” Presented at Net*Working 2002, Australia <http://www.fullcirc.com/community/networkscatalystscommunity.htm>
- [5] Naeve, Ambjorn;, Mikael Nilsson, Matthias Palmer, Fredrik Paulsson (2005) “Contributions to a public e-learning platform: infrastructure; architecture; frameworks; tools” International Journal of Learning Technology, Volume 1, Number 3 / 2005, pp352-381
- [6] Education and Skills Committee (2005) Education and Skills: Third Report, House of Commons, London <http://www.publications.parliament.uk/pa/cm200405/cmselect/cmgeduski/205/20502.htm>
- [7] Goodyear, Peter (2001) “Effective Networked Learning in Higher Education” Volume 3 of the Final Report JCALT, CSALT, University of Lancaster, Lancaster
- [8] Ciber (2008) Information Behaviour of the Researcher of the Future, University College, London
- [9] Cross, Jay (2006) “Informal Learning: Rediscovering the Natural Pathways That Inspire Innovation and Performance” Pfeiffer Wiley, San Francisco, CA
- [10] European commission (2000) A memorandum on Lifelong Learning [p8] <http://ec.europa.eu/education/policies/lll/life/memoen.pdf>
- [11] IBM (2006) Innovation Jam https://www.collaborationjam.com/get_started2006/index.shtml
- [12] Green, Hannah; Facer, Keri and Rudd, Tim (2005) The Learner’s Charter for a personalised learning environment, NESTA Futurelab, Bristol
- [13] Hewlett Foundation (2007) “Open Educational Resources (OER) – Making High Quality Educational Content and Tools Freely Available on the Web” <http://www.hewlett.org/Programs/Education/OER/openEdResources.htm>
- [14] <http://ocw.mit.edu>
- [15] <http://openlearn.open.ac.uk/>
- [16] myWORLD (2007) “Blackbird Leys CV Builder in Moodle” http://my-world.typepad.com/my_weblog/2007/02/screen_shots_fr_1.html
- [17] Illich, Ivan (1971) “Education Without School: How It Can Be Done”, New York Review of Books Volume 15, Number 12 - January 7, 1971 Special Supplement: <http://www.nybooks.com/articles/10701>
- [18] Wilson, Scott (2005) “Future VLE: The Visual Version” Scott’s Workblog, 25th January, 2005 <http://zope.cetis.ac.uk/members/scott/blogview?entry=20050125170206>
- [19] Aspineli, Martin (2005) “A model of a mature open source project” London School of Economics, MSc Analysis Design and Management of Information Systems
- [20] Konrad, John (2005) “Validation of Non-Formal and Informal Learning in United Kingdom”, Ecotec, Birmingham http://www.ecotec.com/europeaninventory/publications/inventory/chapters/euro_inv_uk.pdf
- [21] LET (2007) “Areas of Activities” Learning from Experience Trust <http://www.learningexperience.org.uk/projects/index.php>
- [22] Downes, Stephen (2007) “Models for Sustainable Open Educational Resources” Interdisciplinary Journal of Knowledge and Learning Objects, Volume 3, 2007, pp 29-44 <http://ijklo.org/Volume3/IJKLOv3p029-044Downes.pdf>

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