Making it rich and personal: meeting institutional challenges from next generation learning environments

Su White, Learning Societies Lab, ECS, University of Southampton, UK – saw@ecs.soton.ac.uk
Hugh Davis, Learning Societies Lab, ECS, University of Southampton, UK– hcd@ecs.soton.ac.uk
Debra Morris, Hartley Library, University of Southampton, UK – D.Morris@soton.ac.uk
Peter Hancock, iSolutions, University of Southampton, UK – P.J.Hancock@soton.ac.uk

Abstract

The understanding that personal learning environments provide a more realistic and workable perspective of learners' interactions with and use of technology has gained widespread acceptance across many of the communities interested in learning and teaching technologies within higher education.

However in universities the service which normally purchases and deploys technology infrastructure is typically, and understandable, risk-averse, the more so, because the consequences of expensive decisions about infrastructure will stay with the organisations for many years. Furthermore across the broader academic community the awareness of and familiarity with technologies in support of learning may be varied. In this context work to innovate the learning environment will require considerable team effort and collective commitment.

This paper presents a case study account of institutional processes harnessed to establish a universal personal learning environment fit for the 21st century. The challenges encountered were consequential of our working definition of a learning environment which went beyond simple implementation – in our experience the requirements became summarised as 'its more than a system, it's a mindset'. As well as deploying technology 'fit for purpose' we were seeking to create an environment which could play an integral and catalytic part in the university's role of enabling transformative education.

Our ambitions and aspirations derive from evidence in the literature, for example, van Harmelen on personal learning environments (2006), Downes on e-learning 2.0 (2005) and the recent report by Bradwell for Demos on the Edgeless University (2009).

We have also drawn on evidence of our recent and current performance; gauged by institutional benchmarking and an extensive student survey. The paper will present and analyse this qualitative and quantitative data. We will provide an account and analysis of our progress to achieve change, the methods we used, problems encountered and the decisions we made on the way.

1. Introduction

Contemporary practice in the use of technology has evolved rapidly in the early years of the 21st century. There has been considerable progress in network technologies, miniaturisation and telephony services. These changes have made an impact on practice and thinking across all types of computer applications from those

which are concerned with large scale organisational and infrastructural to smaller scale personal and mobile applications.

In business and commerce large-scale computer systems have moved away from single centralised monolithic architectures towards shared distributed architectures. Individual use of technology for the majority in post-industrial countries has become widespread. Greater accessibility to personal computers, laptops, netbooks and mobile devices has, for many led to integrating personal technology into everyday use extending across the whole range of individual activities; life, leisure and learning.

However, while individuals can be agile in their response to technology changes organisations are typically more constrained by the heritage of past decisions and previous investment. In addition organisations can find that they are required to provide consistency (in software, platform or infrastructure) for large numbers of individuals with differing needs and requirements. For the organisation these factors can tend to slow the process of change, so that in a time of rapid technological development and adoption the gap between everyday practice and organisational provision can increase.

A growing understanding of these difficulties has emerged at the University of Southampton. It has fired an institutional ambition to provide a technology infrastructure to be known as the 'Southampton Learning Environment'.

This ambition has been influenced to some extent by contemporary development in the modelling of Personal Learning Environments (PLEs), growing use of the social web, definitions and applications of Web 2.0, and effective use in our School of Electronic and Computer Science of linked data for educational and associated administrative applications.

As well as being influenced by external technological developments, the requirements for this system have been derived following extensive analysis of existing practice. The university initially engaged in an e-learning benchmarking exercise which was followed by a large-scale survey of the student experience of technology. At the same time a set of colleagues concerned with the management of teaching and learning across the institution participated in a national Higher Education Academy (HEA) Enhancement Academy. This latter initiative helped provide some additional impetus required to developed policy to bring about changes in our current practice. This work was led by the university director of technology-enhanced learning (TEL) and formed part of a framework of changes under an umbrella initiative titled the curriculum innovation programme[1]. Thus prepared and armed with a large amount of information the University of Southampton has begun designing the "Southampton Learning Environment" (SLE) as a virtual adaptable and innovative environment fit for the next 10 years

2. Local context

The University of Southampton was an early adopter of technology for learning and teaching based on personal computer networks. Prior to the web in the early 1990s the university made extensive commitment to the use of a locally developed hypertext system called Microcosm. It embarked on an ambitious project to establish

[1] University of Southampton Curriculum Innovation Programme: http://www.soton.ac.uk:443/cip/index.html

a ‘campus-wide structure for multimedia learning’ (White 1993). Colleagues across the institution developed approaches to resource-based learning which were subsequently incorporated into materials and instructional practice via web-based learning resources and taught modules delivered by the institutional virtual learning environment (VLE).

Over a ten-year period academics’ attitudes to and use of technology across the university were tracked and analysed. It was observed that usage grew alongside national and international trends which saw an expansion of the ownership of technology and increasing use of the web as a platform for publication (White 2006).

Over this period university-wide commitment to a virtual learning environment was introduced to help overcome differences in technical infrastructure which existed between departments teaching (predominantly) hard applied subjects in science and engineering compared with departments who were concerned with arts, humanities and the social science.

In 2007, motivated by a desire to better understand the impact of changes in practice, the university embarked on an institution-wide exercise to benchmark eLearning practice (White and Davis 2008) . The analytical approach was based on Marshall’s eLearning Maturity Model (eMM) originally developed in the New Zealand Higher Education system (Marshall and Mitchell 2006).

The benchmarking process was supported by the HEA academy, as well as providing an opportunity to develop internal understanding of the ‘state of play’ for e learning, we were able to compare our understandings and learning with those of other institutions using the same process. Southampton was clustered with a number of other ‘research intensive’ universities but we also exchanged our findings with a wider range of institutions of differing organisational types.

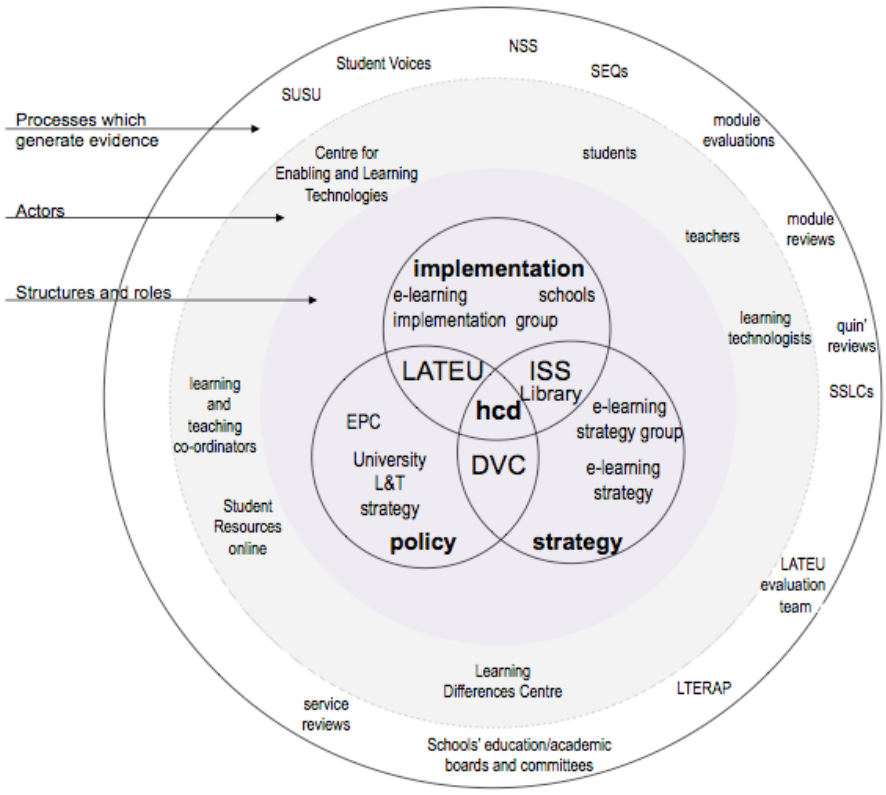

Figure 1: A framework for TEL practices across the university

One outcome of the benchmarking process was a formalised understanding of a framework for identifying practice and information sources and enabling informed discussion and collaboration across the institution. The framework, as show in figure 1 above, summarised the key processes, actors, structures and roles associated with Technology Enhanced Learning (TEL) in the university.

This framework would subsequently play an important role in helping to specify the Southampton Learning Environment

3. From personal to rich learning environments

In addition to analysis of existing practice in our institution, a number of factors have contributed to the growing awareness of the value of framing our models of learning technologies from a personal learning environment perspective including:

- The constraints and limitations of virtual learning environments;
- Increasing independently initiated use of technology by learners;
- Observed changes in cost and availability of technology;
- Theoretical modelling of systems and behaviours.

These factors have emerged in a number of ways in studies and discussions of the role and nature of current and future learning environments and their technological context.

A large body of work had analysed and discussed personal learning environments most often from the perspective of student and teacher. Van Harmelen's study of Personal Learning Environments (Van Harmelen 2006), Atwell's consideration of PLEs as the future of eLearning (Attwell 2007) the JISC CETIS report (JISC 2007) on Personal Learning Environments mark a clear stage in the development of ideas which had been much discussed across the learning technologies community in previous years.

Alongside the CETIS report, Scott Wilson's visualisation of the components of a PLE have formed a focus for numerous discussions. An earlier contribution which undoubtedly influenced UK thinking took a strong systems perspective. (Olivier and Liber 2002). From the pedagogic viewpoint, It is possible to see aspects of the conceptualisation of personal learning environments in the body of work which was published around constructivist education and active learning during the early 1990's, see for example the Manifesto for a constructivist education in higher education (Jonassen, Mayes et al. 1993).

Conceptualizations of PLEs, discussions of their relevance, constraints, advantages and roles have continued to occupy journal editions, discussion time, conference space and blogging posts. The approach which we have chosen to take at Southampton is from a perspective of technology affordances (Gaver 1991; Gaver 1996). Our interest is in enabling the learner to operate within a consolidated environment where they intermix their own chosen environments with others which have functions to perform in support of the processes of learning. This has led us to articulate our idealized environment as a rich learning environment discussed within the case study details in section 3 below.

3.1 Beyond web 1.0

Discussions and definitions of PLEs frequently incorporate assumptions of the social web. Shirky defines the social web as 'software that supports group interaction', (Shirky 2003) shortly afterwards, first at conference discussions, and then formally in

a published paper O'Reilly defines web 2.0 and encapsulates his thinking through his meme map (O'Reilly 2005; O'Reilly 2007). In everyday discussion the two concepts of the social web and web 2.0 have become intermingled – understandably since many of the technology affordances of web 2.0 support or even engender Shirky's concept of the social web. It is worth observing however that social software can be seen to predate web1.0. Social software in action has in effect been operational from the time of bulletin board forums which flourished during the 1980s in forms such as The Well. From the point of view of the social web, discussions and definitions of personal learning environments frequently include explorations of learners ' behaviours mediated by the use of social software. This realization of the social web sees social software fulfilling the requirements of original conception of the 'read-write web' from Berners-Lee.

The social web has special value because applications such as blogs and wikis which support writing, publishing, sharing and commenting can also support learning activities. The affordance of social web applications which enable and encourage learners to explore ideas through engineered opportunities for reflection and engagement fulfils a core role in the constructivist model. The social web is also of interest from the perspective of supporting and enabling Wenger's communities of practice (Wenger 1998).

However, while these are undoubtedly educationally useful facets of personal learning environments, from the perspective of the Southampton Learning Environment, the social web is interesting in different ways in terms of the challenges to educational assumptions which it may present. In particular, because of learners' prior or current experience of the social web:

- Learners have other virtual identities via the social web which will intersect with their virtual identities in an institutional context
- Learners may well have established (and effective) practices of virtual communications
- Learners may feel critical of, or hostile to institutional environments because of their prior experience of social web applications

These observations are not new and can be found in the existing literature, but do lead us towards our technology affordances-led definition of our rich learning environment. They are observations may be relevant to guiding our educational decisions in terms of how we choose to implement our environment and perhaps what affordances we particularly wish to develop, exploit, or take into account.

The web 2.0 point of view is more relevant to articulating the technological assumptions which will underpin our conceptions of the Southampton Learning Environment. O'Reilly contrasts the software features which can be used to differentiate web 1.0 – the vanilla web, with web2.0. He places the following features at the core of his web 2.0 meme map

- the web as a platform
- you control your own data
- services not packaged software
- architecture of participation
- cost-effective scalability
- re-mixable data source and data transformations
- software above the level of a single device
- harnessing collective intelligence

(O'Reilly 2005 op cit)

This list provides resonances for our technical collaborators and designers who have an aspiration to 'let computers do the tedious stuff'. Downes provides an interesting (and prescient) outline on eLearning 2.0 (Downes 2005) which includes references to the web of linked data and semantic technologies which Tiropanis et al have been able to track coming into use much more recently (Tiropanis, Davis et al. 2009).

Both Downes and O'Reilly anticipate the world of mash-ups and the realization of the potential for sharing, aggregation and interoperability which can come about through the use of standards for data identification and exchange.

3.2 The edgeless university

A more over-arching view is presented by Bradwell. When proposing an 'Edgeless University' Bradwell's report for Demos suggests that technology offers a means for institutions to find a collaborative response to external changes such as an economic downturn (Bradwell 2009). His account tracks ways in which technology has already impacted on educational experiences via data collected from a set of interviews and group discussions. In the context of the PLE he anticipates a future with increasing volumes of open content supported by an e-infrastructure for higher education.

This authoritative report commissioned by the current provider of key networked services for UK universities and further education colleges envisages a future infrastructure outside of individual institutions, and suggests a context in which future individual planning decisions can reasonably be made.

Taken together, personal learning environments, the social web, web 2.0, linked data, the semantic web and over-arching changes in the use of technology and commonplace infrastructure communicate an inevitable future of changed technology practice in education. The challenge for institutions is to successfully anticipate the most important future changes. While continuing to meet the demands of providing day to day support for learning, institutions need to set in place mechanisms to update their personal infrastructure in a way which is cost effective and sustainable in the longer term.

4. Defining the Southampton Learning Environment

During the period described the university purposefully moved away from describing the remit of this work as e-learning in preference using the phrase Technology Enhanced Learning. Throughout the period the work was led by a university director of education who was working with a group of colleagues drawn from across the academic schools and from the professional support services.

In our Benchmarking final report (Jan 2008) we noted that "At the University of Southampton we have reached the stage where technology is ubiquitously used by our students, who have an expectation of interacting online: for admin; for learning and for university life in general. The University has a high quality infrastructure and most modules have an on-line presence". However we were also aware that we needed some additional insights into the everyday experience of our infrastructure from our students.

4.1 Student survey

In 2009 we carried out a major survey of the student experience of e-learning (919 students answered 34 multi-part questions), Basic demographic analysis of the data is shown below in tables 1-3

School	Respondents
Civil Engineering and the Environment	75
Chemistry	2
ECS	114
Geography	38
Mathematics	13
Engineering Sciences	30
Ocean & Earth Sciences	30
Physics & Astronomy	13
ISVR	8
Biological Sciences	25
Health Sciences	193
Medicine	43
Psychology	26
Humanities	151
Law	15
Social Sciences	71
Art	48
Education	2
Management	23
Other	3

Table 1:respondents by academic school

Year	Respondents
Year 0	14
Year 1	259
Year 2	288
Year 3	210
Year 4	50
Year 5	4
Postgrad.	93

Table 2: Respondents by year of study

Age	Respondents
Under 18	8
18-21	500
22-25	172
26-30	59
31-40	62
Over 40	73

Table 3: Respondents by age group

We had support from our students Union in administering the survey which enabled us to draw data from a good proportion of the University's 20 academic schools. Taken as a whole, the data which was returned was broadly consistent with other surveys in the sector which examined the learners experience of technology – notably the findings of the JISC Learners Experience Programme (Conole, Laat et al. 2006).

The data confirmed the ubiquity of personal technology. Asked about ICT equipment types and whether students had any of them for their exclusive use during term time. Of all respondents, only 25 had none of the options for their exclusive use:

ICT Equipment	**Respondents**
Laptop	782
PC	292
PDA/Smart Phone	142
MP3 Player	289
iPOD	450
None	25

Table 4: levels of ownership of personal technology

How often do you use the following tools/websites/systems?							
	> once a day	**Daily**	**> once a week**	**Weekly**	**Monthly**	**Have used**	**Never**
Blackboard	143	218	215	122	65	72	82
Online assessments	15	20	51	100	164	342	190
SUSSED Portal	312	252	102	77	54	59	30
Facebook	422	189	101	50	29	36	84
Text Messaging	571	195	71	28	11	17	19
Instant Messaging	215	128	139	75	74	142	126
Skype/VoIP etc	99	68	82	68	69	194	320
Google	566	204	99	23	6	4	13
Google Scholar	66	57	130	91	104	176	268
Wikipedia	103	103	242	159	123	141	35
YouTube etc	120	131	216	154	116	119	57
Flickr (or similar)	14	12	30	46	49	201	548
Del.ic.ous / DIgg or other Bookmarking sites	18	15	19	23	17	70	742
Twitter	27	18	22	16	11	70	737

Table 5: Use of Websites and Systems

Three questions gathered qualitative data. These questions were designed to explore barriers and frustrations which learners experienced in their use of technology.

The questions highlighted the range of different problems which might be encountered. The biggest issues were associated with connectivity. In some cases it was possible to infer that additional information and support for users might have prevented some of these problems from arising. In other instances the responses pointed to issues generated by known constraints brought about by details of software licensing and access agreements for services such as electronic journals.

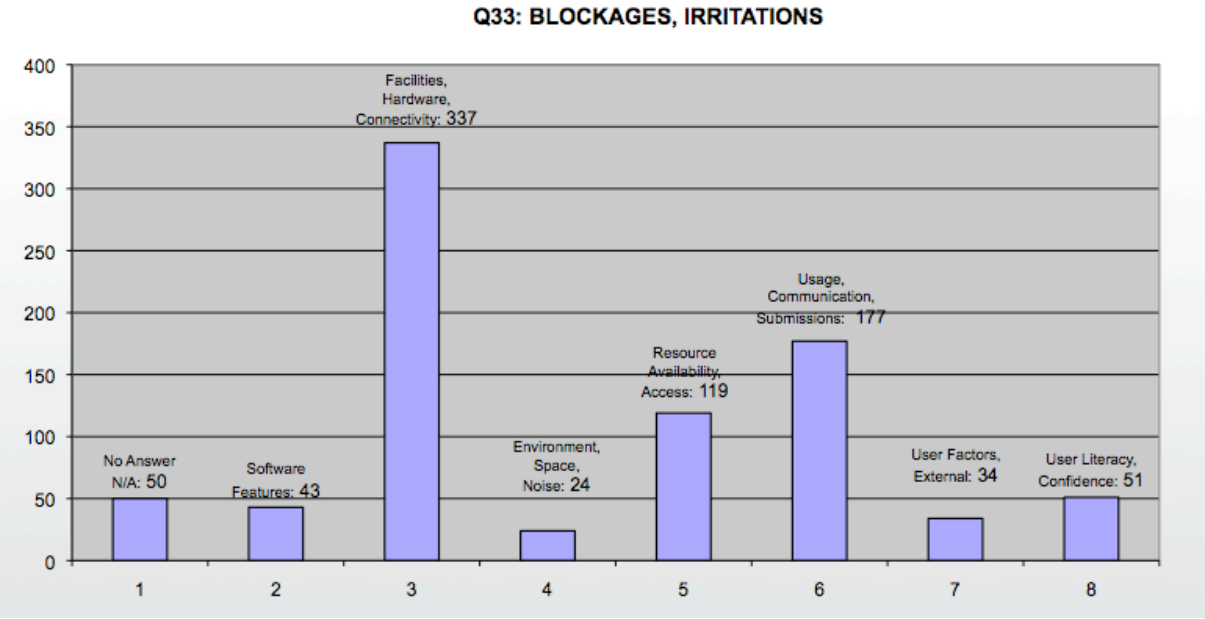

Figure 2: Blockages and irritations encountered by students

This data provided a valuable backdrop to subsequent discussion when we tried to specify the proposed environment. In addition, for our support services (library and computing infrastructure) the survey was invaluable in augmenting their student feedback data routinely collected across the academic year.

4.2 Enhancement academy

In parallel to the process of data collection and analysis, senior colleagues directly engaged with the management of teaching and the support of learning at the university agreed to participate in a national enhancement academy.

The enhancement academy engaged participants in a development process. The university team was given a brief to identify proposed changes. A critical friend with extensive experience of managing change in technology innovation was assigned to work with the management team providing ongoing support and consultancy.

The university team put into place a working group of champions, innovators and sponsors (the Southampton Learning Environment team) which worked in conjunction with the already established Technology Enhanced Learning Support and Innovation Group (TEL-SIG). There was some overlap between the two groups which was beneficial in retaining consistency in discussions and decision making.

4.3 Facilitating understanding

Early meetings of the Learning Environment Group were concerned with ensuring that the vision for the proposed environment could address the twin aims of

supporting *living and learning*. This perspective would ensure a shared vision for university support services and the academic schools.

Different specialisms and expertise existed and time was needed to develop understandings of the necessary assumptions which were associated with each specialism. Learning Environment meetings became a forum in which to share and discuss understandings. One example of this, which became useful during discussions is the visualization of a Rich Learning Environment which is show as figure 3 below.

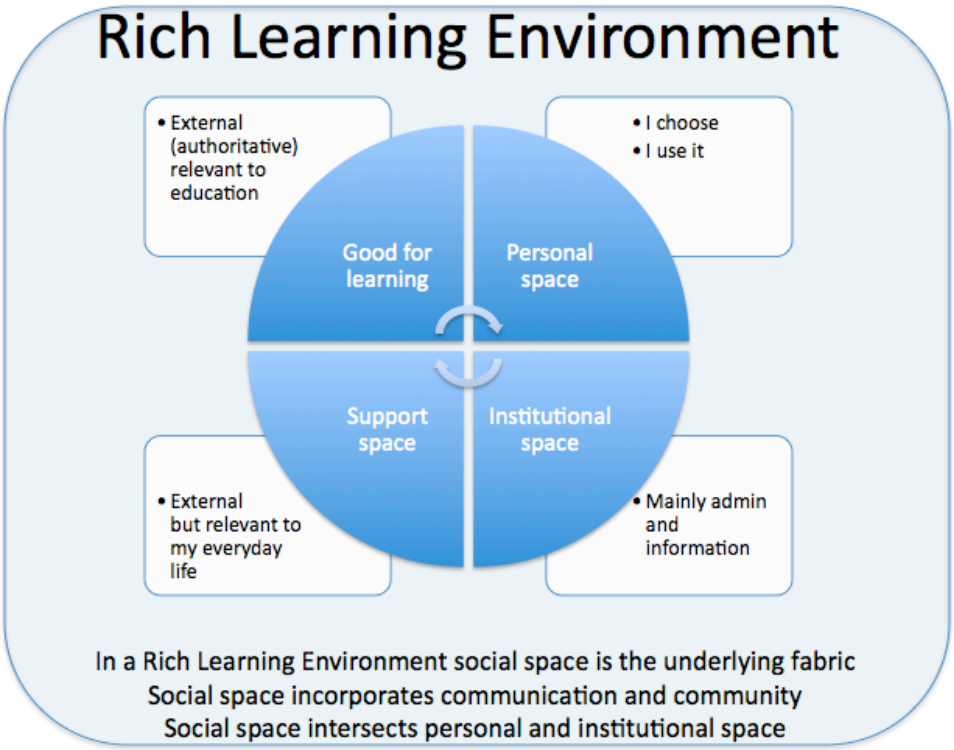

Figure 3: components of a rich learning environment

Having found the enhancement academy process a useful one, it was agreed that the learning environment group would also participate in a facilitated 'mini' enhancement academy which was jointly organised with the critical friend.

The mini academy incorporated a variety of 'thinking exercises' the outputs of which were captured into documents and diagrams which have been used to take forward the specification for the Southampton Learning Environment.

4.4 Southampton learning environment

We have defined the scope of the Southampton Learning Environment as:

> *The Virtual space with which the learner associated with Southampton University is engaged. This definition incorporates the impact of the virtual space on the Physical space utilised by these Learners*.

Four fundamental drivers for change were identified. They comprise the desire to:

- support curriculum change and innovation
- address student expectations

- enable the university to remain credible in its support for learning and teaching with a particular desire to be seen to be fluent and innovative in the use of IT
- facilitate the adoption of a University-wide educational style

Working with out colleagues responsible for the technology infrastructure we were able to produce the following summary of our ambitions (figure 4).

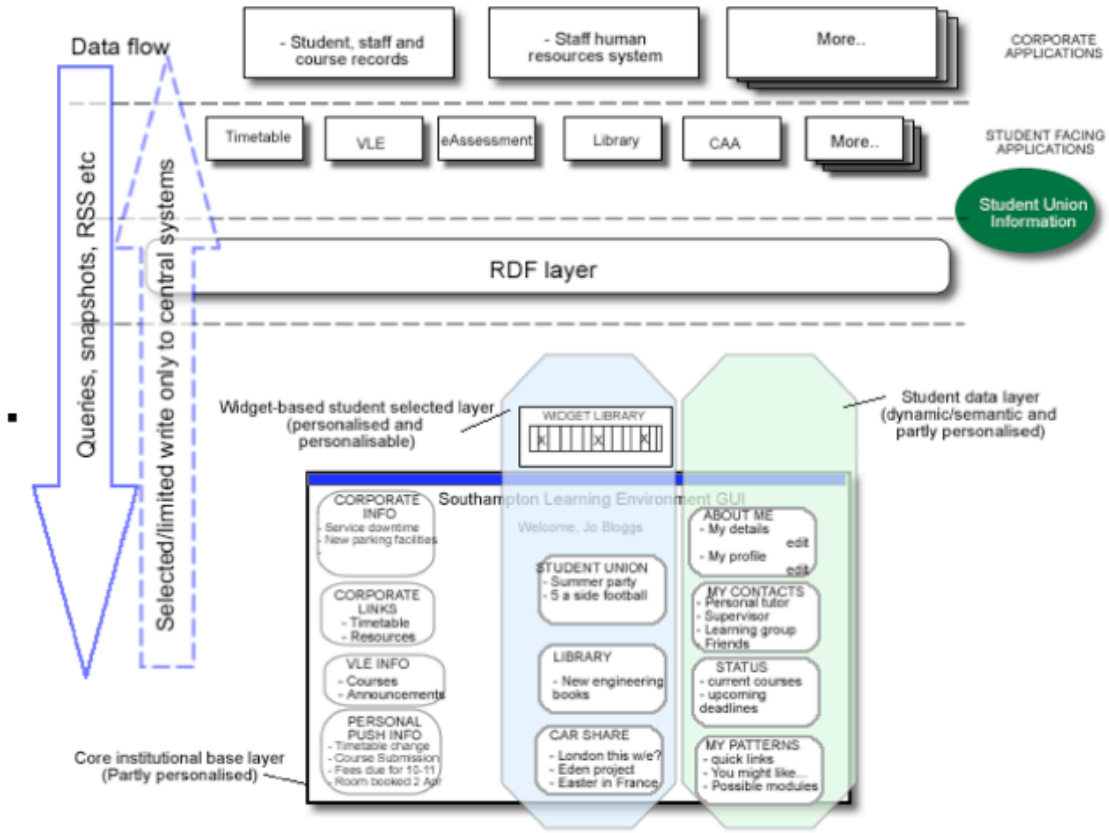

Figure 4: Proposed SLE Architecture showing personalised widget/portal front-end to SLE and the existing student facing applications and enterprise DBs.

It is our long term goal that all processes associated with the support of learning and teaching should be managed on-line, and that all processes associated with learning and teaching should be possible to organise on-line, so far as is pedagogically desirable. In this sense we are saying is that our direction of travel is towards being able to perform (as and when we wish to) as a “Virtual University”.

It will provide information and systems to support both learning and living;

The information provided will, so far as is appropriate, be personalised for the user and the interfaces to the systems will be personalisable by the user. (It will be a “PLE”, or Rich Learning Environment);

5 What have we got?

It is interesting to observe the extent to which our collaborative workings achieve a number of the principles of web 2.0 suggested by O’Reilly’s meme map.
Student feedback from the survey suggested that while we have for some time had

reliable systems, they are now becoming rather “long in the tooth”, and showing their age in a Web 2.0 world where everything and everyone is connected.
The vision of the Southampton Learning Environment assumes the web as a platform. Proof of concept from our school of Electronics and Computer Science has demonstrated how this is possible. Other projects around the university demonstrated the range of possible solutions.

The necessary assumptions of an environment which has the complexity to address the agenda of living and learning necessarily looks to services rather than packaged software.

The university is establishing applications which incorporate user generated content. The commitment to services such open repositories for learning is necessarily changing the architecture of our systems. We are designing in aggregation and personalisation, mixing data from a range of sources, and making a commitment to exposing data for reuse whilst preserving a secure core.

6. Conclusions and Future Work

Many of the systems/applications that currently support the student experience have been in existence for a long time. They were configured (in many cases) from a technical viewpoint with limited appreciation of the evolving pedagogic and student needs. They do a practical job against their original production remits. However, the world has changed.

The process of collaboration supported by the working groups and enhancement academy activities have been powerful catalysts for facilitating communication across different (and sometimes disparate) specialisms.

Different understandings of Personal Learning Environments have provided a starting point which has been used to integrate differing viewpoints, technical and non technical, educational and administrative. The university has benefited from long established expertise, but also recognises that the purposeful engagement in developmental activities was crucial for bringing about change. It remains to be seen what the long term impact of these plans will be, but we look forward to future implementation and further evaluation.

7. Acknowledgements

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