Towards an Institutional PLE

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Abstract

PLEs in their broader sense (the ad-hoc, serendipitous and potentially chaotic set of tools that learners bring to their learning) are increasingly important for learners in the context of formal study. In this paper we outline the approach that we are taking at the University of Southampton in redesigning our teaching and learning infrastructure into an Institutional PLE. We do not see this term as an oxymoron. We define an Institutional PLE as an environment that provides a personalised interface to University data and services and at the same time exposes that data and services to a student's personal tools. Our goal is to provide a digital platform that can cope with an evolving learning and teaching environment, as well as support the social and community aspects of the institution.

Keywords: Institutional Environments, User Experience, Co-design

1. Introduction

Although they are most often associated with informal learning PLEs in their broader sense (the ad-hoc, serendipitous and potentially chaotic set of tools that learners bring to their learning) are increasingly important for learners in the context of formal study. It has been argued that they represent a conceptual shift in how institutions should support learning through their digital systems (Wilson et al. 2006).

In this paper we explain the work being undertaken at the University of Southampton in the UK to redesign our teaching and learning infrastructure into an *Institutional PLE*. We do not see this term as an oxymoron. We define an Institutional PLE as an environment that provides a personalised interface to University data and services and at the same time exposes that data and services to a student's personal tools. Our approach is similar to the iPLE described by Casquero et al (2010), but we have emphasized co-design with students and staff, and ambitious enterprise-level integration. The aim of our work is to provide an infrastructure that can act as the basis for an evolving digital teaching and learning environment, loosely couple legacy systems, and provide support for the social and community aspects of the institution (including pre-registration students and alumni).

The paper is structured as follows. Section 2 presents background and related work, and explores some of the challenges that PLEs present to institutions. Section 3 describes the motivation for our work in Southampton, and presents the development principles that have evolved and now form the guidance for our on-going work. Section 4 describes the co-design methodology that we have used to develop our PLE and discusses the outcomes of our co-design sessions. Section 5 presents the resulting design and our first prototype implementation. Section 6

discusses our deployment strategy and future work plans, and finally Section 7 concludes the paper.

2. Background

In this section we explore the history and motivation for PLEs (especially in regard to our evolving understanding of digital literacy) and look at the challenges that these ideas raise in an institutional setting.

2.1 The New Web Literacy

The continuing debate around the digital literacy of modern learners, our expectations of them and their expectations of us as educators, is perhaps best captured by Prensky's evocative notion of Digital Immigrants and Digital Natives (Prensky, 2001). Prensky was not the first to suggest that their had been a step change in student's engagement with technology, a year before Jason Frand outlined ten attributes of the information-age mind-set including 'Computers aren't Technology' and 'Internet Better than TV' that painted a picture of a new generation of tech-savvy students that multi-tasked and collaborated in a much richer way than those before them (Frand, 2000).

Prensky and Frand set out these differences as a *clash of generations*, or as an *inherent mind-set*, but later researchers have taken a less extreme view and have framed them in terms of *digital literacy* (Aviram and Eshet-Alkalai. 2006). This removes the contentious notion that a particular group is inherently more sophisticated at using digital tools, and instead has allowed the e-learning community to consider the constituent skills and values that come together to enable users to take full advantage of Web 2.0 style computer applications and systems (for example, separating out Information Literacy from Socio-Emotional Literacy (Eshet-Alkalai, 2004)).

More recent studies show that when considered in this more granular way there are some generational trends, but that these are both positive and negative. For example, a British Library/JISC study in the UK found that while younger people do communicate more readily in a digital form than older people, their ability to distinguish information sources was not as sophisticated (Williams and Rowlands, 2007). So while we can see a trend towards increased sophistication in the use of personal digital tools, we must be careful about making generalisations.

2.2 Personal Learning Environments and Institutions

Higher Education Institutions have traditionally used Virtual Learning Environments (VLEs) such as Blackboard or Moodle to enable teachers to manage cohorts online and communicate with their students digitally. Personal Learning Environments (PLEs) are a reaction to the increasing digital literacy and sophistication of users, and instead of a monolithic learning environment propose a more open system that co-ordinate the services of a wide variety of services and individuals. Systems such as PLEX (Wilson et al. 2006) and mPLE (Van Harmelen, 2008) have a student-focused interface that enable personal goal setting and note taking, and integrates with third party tools (such as 43 things, a goal management web-site).

However, PLEs pose a number of serious questions for educational institutions that are attempting to provide digital services and technology enhanced learning to their students and staff, including:

- *How should institutional systems interact with personal learning environments?* Sclater points out that students often already have a personal learning environment (or at least a set of tools) in place before they begin their

formal studies (Sclater, 2008) and that any institutional system needs to integrate with these. He also identifies the problem of situating the PLE within the institutional context (of learning objectives, assessments, etc).

- *How do teachers and students negotiate the tools and mash-ups used in study?* Severance et al. (2008) highlight the importance of mash-ups for PLEs and identify a number of specific e-learning technologies that can support them (for example, OKI and IMS Learning Design. But this raises the question of how teachers and students agree on the tools to be used for learning activities and assessment. For example, a teacher might want to use a local wiki for collaborative document creation, but students may be more comfortable using a third party service such as Google Docs.
- *How can students and teachers collaborate in what can be a complex semi-private space?* It has been noted that students wish to keep their personal social spaces separate to their learning spaces (JISC, 2007), but Razavi and Iverson go further in exploring how students feel about the privacy of their study, noting concerns such as blogs being visible to the general public, and some shared material (such as personal reflections) revealing to much personal information to other students (Razavi and Iverson, 2006).

Our approach has been to tackle these challenges from the ground up by enabling individual flexibility and choice, rather than trying to solve them universally from the top down. In the next section we explain our philosophy and how this has translated into a set of engineering principles for the new Southampton Learning Environment.

3. Motivation and Principles

The University of Southampton in the UK is a relatively large higher education institution with over thirty thousand staff and students. Over the last few years the University has been reviewing its technology enhanced learning (TEL) infrastructure, and alongside reviewing its commitments to key infrastructure systems, such as its VLE (Blackboard) and student management systems, the University has been exploring how it may provide more flexible support to its students and provide an infrastructure for the future.

Driven by the University's Director of E-Learning, and with the support of a new University TEL Board set up to oversee the process, the University has committed to a SharePoint-based infrastructure that provides a backbone for its future digital infrastructure. We have deployed the SharePoint infrastructure as both an information backbone, loosely coupling our existing data sources into a more accessible shared form, and also the application framework for a new University portal. These two things – loosely coupled data and a flexible application portal – have meant that we have been able to reinvent our existing web portal as a new PLE with the working name of the Southampton Learning Environment (SLE).

The SLE is more than a web portal; it represents a cultural shift in the way that the University engages digitally with both its students and staff. To enable the development to continue with a clear objective we devised and widely shared a small number of key developmental principles that represent a significant shift in the way that the University views its data and users, and places a new emphasis on openness, flexibility and focus:

1) **Be location independent and platform agnostic** – the SLE should be accessible from on or off campus, and should be available on multiple browsers and tools (respecting user's device and application choices).

2) **Enable a single point of access** – the SLE does not aim to replace dedicated services, but provide access to them through summarization and deep linking.
3) **Support the lifelong academic journey** – the SLE should cover both formal and informal learning and support users at all stages of engagement with the University (from application to alumni*)*
4) **Give users control of their own data** – the SLE should allow users to see (and whenever possible) manage the information held about them
5) **Be personalizable but always have sensible defaults** – the SLE should allow users to tailor views and functionality, but should always provide a sensible baseline experience for those who do not wish to personalize.
6) **Do fewer things better** – the SLE should target key functionality and aim to provide a high quality experience of core services rather than maximize coverage across all University systems
7) **Provide the shortest path to key services** – the SLE should aim to provide short navigation and easy access to functionality considered key by users
8) **Support flexible use** – the SLE should not unnecessarily enshrine workflow or usage patterns and should be open to users appropriating its services and abilities in the ways most appropriate to them.
9) **Be open and inclusive by default** – the default should be that data and services are open and accessible to all, and only closed and controlled when necessary.

This cultural change also has a pedagogical dimension that is beyond the scope of this paper, but can be found in White and Davis (2011). In our engineering effort it has manifested in the adoption of a co-design and co-deployment strategy around these principles, and also in the emphasis on the user experience over specific functional requirements, which has been particularly challenging for development staff and IT Managers.

4. Co-design Methodology and Findings

We used a co-design methodology that builds on participatory design principles (Grudin, J. and Pruitt, J. 2002, Sharples et al. 2002). Figure 1 shows an overview of how we interpret this approach in an agile setting, using lightweight design methods such as personas, scenarios and storyboards to capture the discussions (Millard et. al, 2009).

The co-design process is being run in parallel with a larger consultation effort to survey our students in order to understand more about the potential contexts of use and their expectations of the system. This not only provided material for the Shared Understanding stage of the co-design process, but left us free to concentrate our efforts on the user experience and in particular the interaction metaphors that control a user's expectations of how to use the system. In the next two sections we look at the main findings from our survey, and the results of discussing these in our co-design sessions.

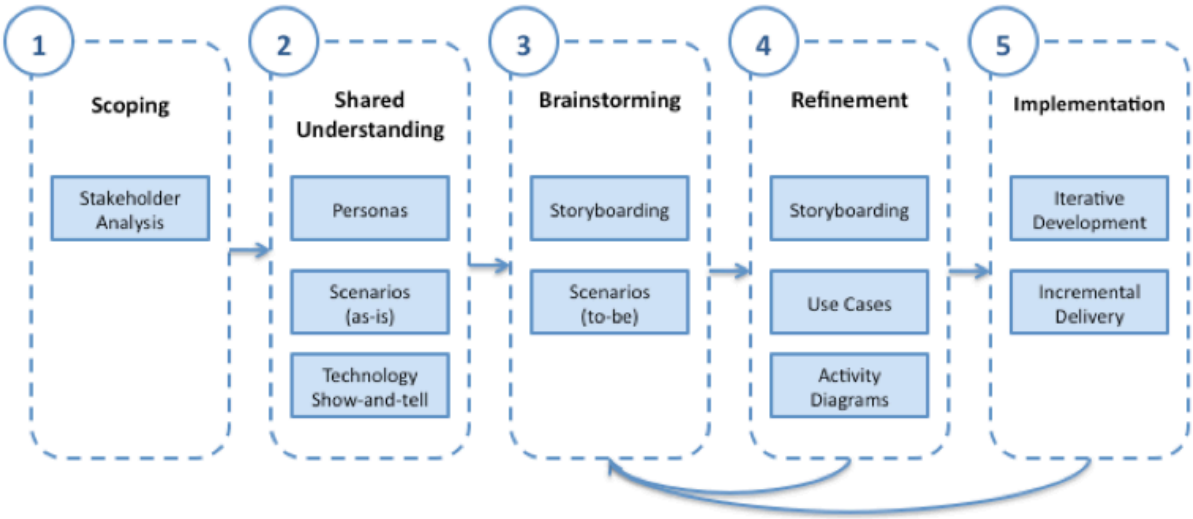

Figure 1: Overview of Agile Co-design Methodology

5.1 Surveys

Our surveys were conducted in the 2010/11 academic year. They were advertised to our students through news channels and posters and were voluntary; in both cases responses were distributed across all eight of the Universities Faculties.

Our first survey focused on attitudes to the current student portal (called SUSSED). We received 896 responses, representing around 2.6% of the total student population

Figure 2 shows a breakdown of the usage of the current portal. The majority of students are focused on using the portal mainly for email, timetable, Blackboard and library access, which the huge majority using email as the main service. Other services mentioned included notice boards, exam timetables and looking up information such as term dates or parking permit information.

SUSSED includes a group mechanism that is open for students to use (e.g. for societies) but these seemed to a cause for confusion, and we received comments such as “Sussed groups - I have literally no idea what function they serve or how and when to use them” and “SUSSED groups seem to be unexplained as to their point!”

We also asked the students what they wanted from a new portal, and the answers are shown in Table 1. What was clear from this question is that their priorities were access to time-critical information and services, however social functions were also perceived as important (such as signing up to clubs and societies, finding helpful staff contacts and locating similar students once they were studying).

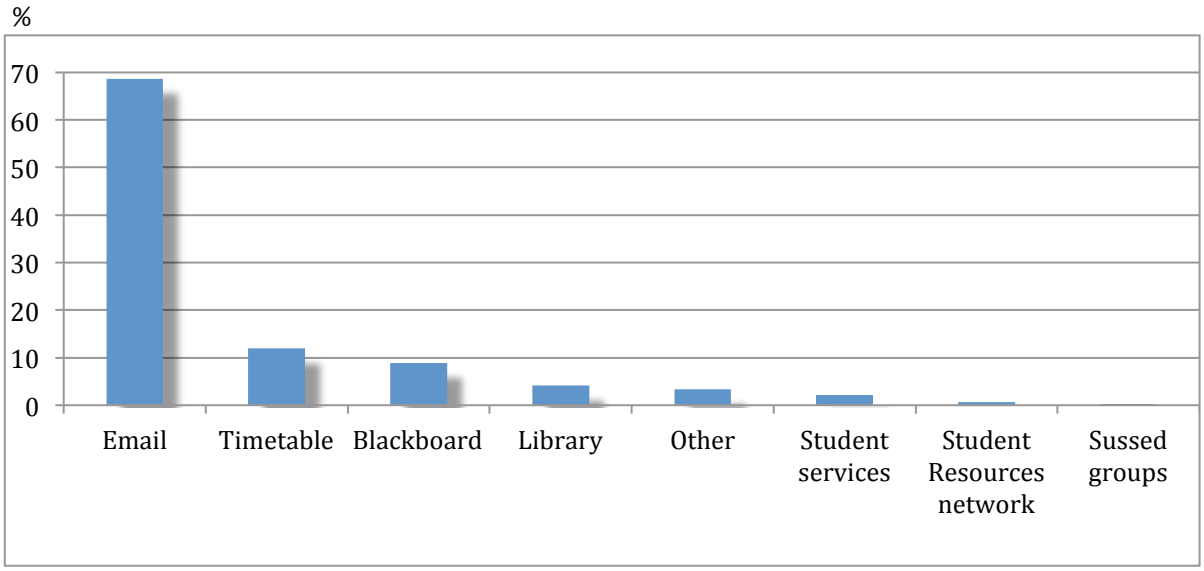

Figure 2. Usage of the current portal (SUSSED)

Pre-arrival:	
Information about the course and study start	**88.6%**
Overview over pre-arrival procedures and deadlines	**86.5%**
Important contacts and helpful staff I can contact pre-arrival	**69.4%**
Information about the University, the Faculty and Southampton	**67.4%**
Info on SUSU, clubs & socs	**55.0%**
Start of programme:	
Timetable	**93.8%**
Campus map	**91.7%**
A personalised list of key people and contact points for me	**65.2%**
Signing up for and paying for sports and rec online	**57.0%**
Sign up list for clubs & socs	**56.2%**
Booking and paying for sports and rec sessions online	**52.1%**
Information on how to move between campuses	**49.0%**
Information on student services	**45.1%**
Finding students who are doing the same or have similar interests	**37.3%**
Info on specific support needs (disabilities and learning differences)	**37.0%**
End of Semester:	
Exam timetable	**88.4%**
Reminders of deadlines for coursework and assessment	**79.8%**
Online submission of work	**73.6%**
Information of optional modules for next year/semester	**73.1%**
Online selection of option modules	**62.1%**
The University's assessment guidelines	**41.7%**

Table 1: Top requirements for different stages of study

A second question asked them to agree or disagree with some our initial plans. Table 2 shows some of the stronger agreements (on a 5 point scale where 0 is neutral). Broadly speaking these comments echoed the requirement for access to timely information, but there also emerged a need for more individual control and access to the personal information held by the University.

Our second survey was focused on personal technology. We received 1112 complete responses, representing around 4.5% of the student population at Southampton. Some highlights from the responses include:

1. 95% have exclusive access to a computer away from campus
2. Mobile phones represent the most significant personal gadgets (87.3%), more recent technology has much lower penetration (for example, only 5% have eReaders, 3.8% have tablets)
3. 50% use apps for personal and educational use. Medicine has the highest penetration (commonly used for looking up medical info).
4. There is a wide use of University Wi-fi services beyond access to our intranet facilities (shown in Figure 3)
5. Use of Web 2.0 technologies is quite uncommon with only Social Networking sites as an exception (shown in Figure 4)

In summary our surveys paint a mixed picture that is more traditional than the one suggested by the digital natives narrative. However, our students do have access to personal technology, and do want more ability to personalise their experience and connect more socially through University systems – as long as it doesn't get in the way of access to important time-based information (such as timetabling and assessment deadlines).

Statement	Mean
I want to be notified immediately of any changes to the timetable	**1.48**
I want to have an online record of feedback I have received	**1.26**
It would be helpful to know more about the class grade AVG and distribution	**1.21**
I want to be able to manage my library account through the portal	**1.16**
All info relevant to my course and student life should be available via the portal	**1.14**
I want to receive reminders of submissions and coursework due	**1.14**
I want info and reminders relevant to me at a time when I need them	**1.09**
I want the portal to contain summary of queries (e.g. iSol, student services)	**1.00**
I should be able to consult all info the uni holds on me	**0.99**
It would be helpful to know previous cohort's evaluation of a module	**0.97**
I want to be able to control who can view my personal profile	**0.92**
I want my timetable to synchronise with my calendar	**0.91**
I want to control which news, updates and events I receive through portal	**0.91**
I want to be able to build an online CV/record of my achievements	**0.86**
All information should be openly available	**0.86**
I want to be able to share my CV with potential employers outside portal	**0.72**
I want to be able to bookmark or tag pages in the portal which are of interest to me	**0.69**

Table 2: Summary of Strong Agreement and Agreement

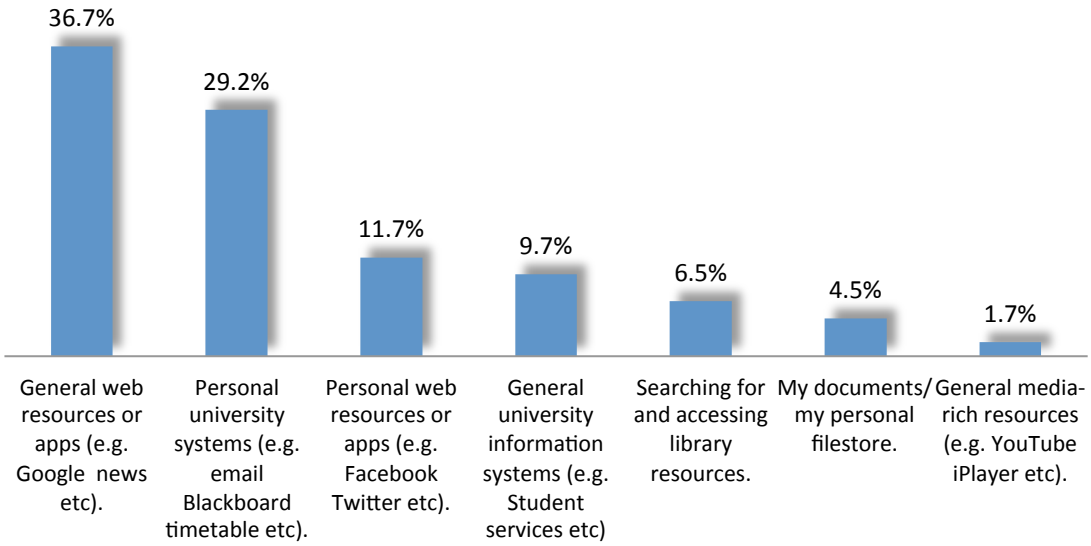

Figure 3: Main use of University Wi-fi facilities

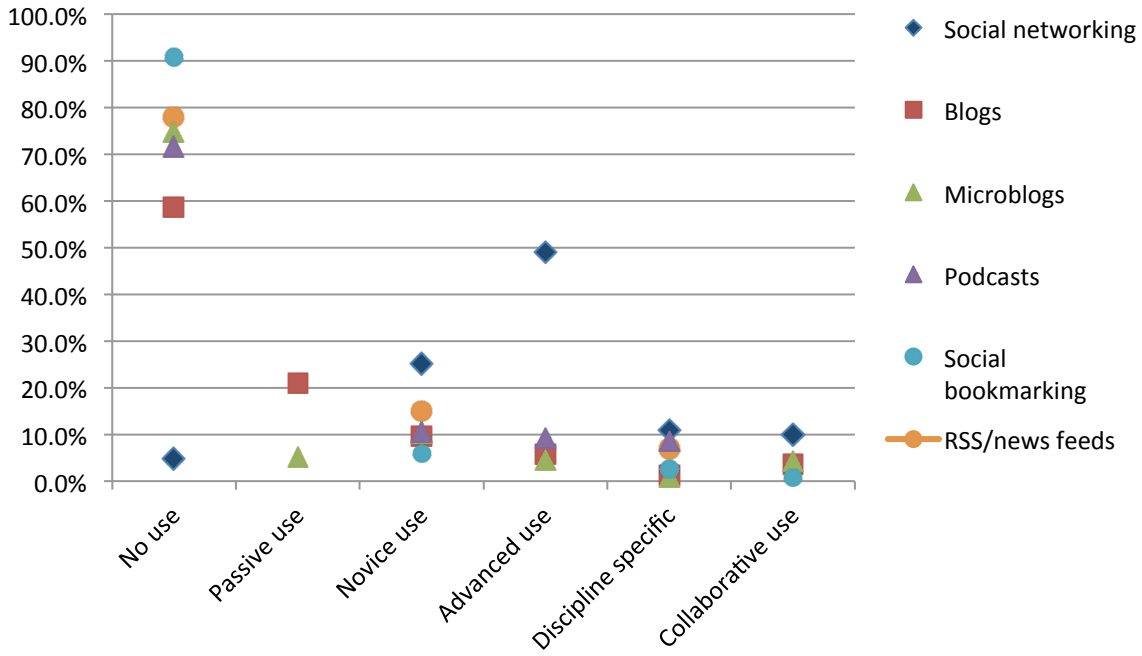

Figure 4: Use of Web 2.0 Technologies

5.2 Co-design Sessions

Our conclusions from this survey was that we did not need a radical functional change (our existing systems provide most of this key functionality already), but instead a conceptual one that allows students to take more ownership of the system and appropriate it for their own uses. This mirrors the conceptual rather than functional change from VLE to PLE as described by Wilson (2006). For example, we were struck by the contrast between our student's attitude to the existing groups mechanism (that they didn't understand it and hardly used it) and their requirements for social functions and personal contacts.

In a number of relatively small co-design sessions (4-8 users, including both staff and students, and a series of one-on-one interviews) we explored these tensions. What emerged was a need to give the students access to the time-critical information they needed within a social context. This in turn led to the development of two interaction metaphors that would shape the user's experience of the new SLE portal:

i) Groups are the Main Lens. Groups are very challenging, on the one hand they could provide much of the key social functionality that students want, on the other they can seem peripheral and secondary to a student's main functional tasks. This seems to be what has happened with our existing portal, where students are unfamiliar with the group mechanism, and unsure of how it relates to the rest of the system. As a result it is neglected and there is no real culture of use. To tackle this challenge we decided that rather than have groups as a small part of the functionality we should embrace them and forefront them as the main lens with which to view the system. For example, rather than having a wiki tool that users could access and then set up permission groups (a tool-first view), we have the user set up a new group and include the wiki tool in the group, which would automatically give write access to all group members (a group-first view). This way the group structures are given high visibility, and it is easy for users to bring new tools into existing collaboration contexts.

ii) Services are Available through Apps. In order to build an extensible platform for the future we have taken the App Store model from mobile devices (which is also familiar to our students) and applied it the portal. Groups and a user's personal homepage become canvases on which to drop apps (implemented as SharePoint web parts – a type of widget). Some apps will bring in whole systems behind the scenes (such as a forum), but the interaction metaphor is the same. Create a group, include some apps, and your bespoke collaboration environment is ready to go.

More formal groups can be created and made available automatically (for example, a student cohort on a module, or a research group), but the *same mechanism* and tools are available for both. We hope that this will mean that familiarity will allow users to appropriate the tools and use them in their own ways.

5. Development and Prototypes

Alongside our co-design meetings we also held a number of developer meetings to develop the ideas more formally. These were then sanity checked with the co-design team. Figure 5 shows one of the whiteboards from a developer meeting where we brainstormed potential layouts of the system, this became a storyboard (constructed in Balsamic) shown in Figure 6, and finally the working prototype shown in Figure 7.

Our current prototype has three key views. Firstly a home page (or Launchpad) where the user can drop any apps that they wish (for example, an email summary widget). By default they get a MyToday App that aggregates alerts and messages from around the system (responding to the need for timely information). Our approach has been not to replicate functionality, but to use deep linking where we can. So links in MyToday take the user to the appropriate system where further actions can be made.

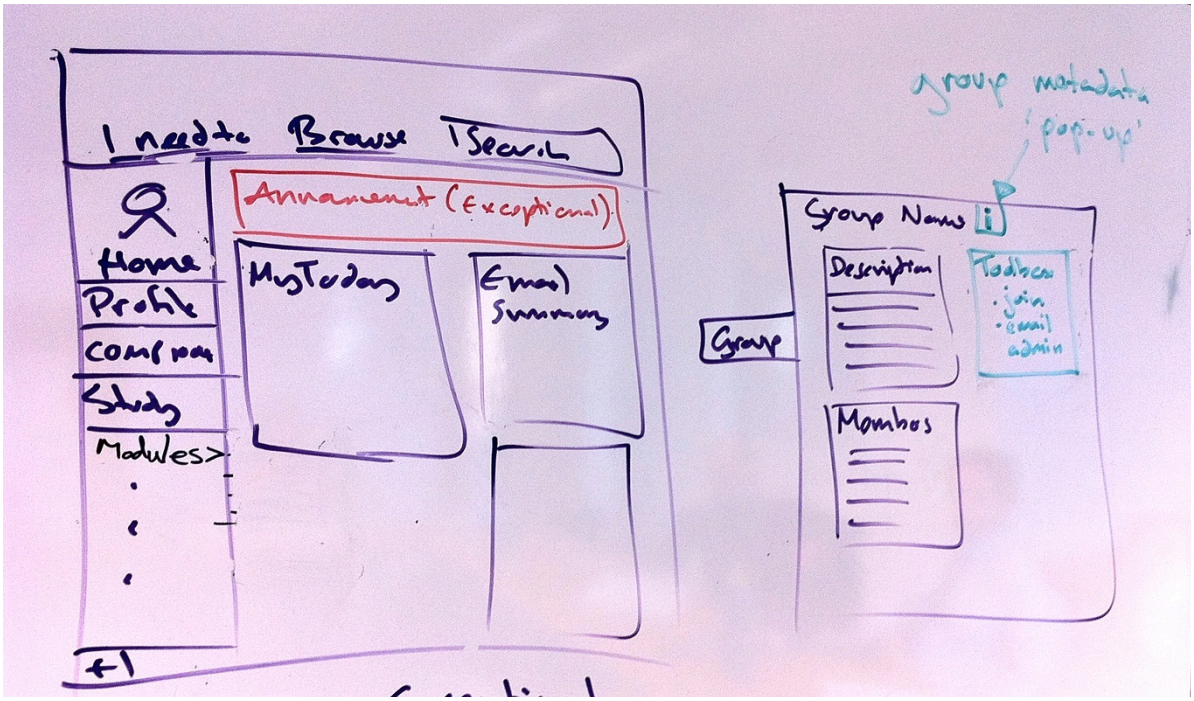

Figure 5. Whiteboard captured during brainstorming session

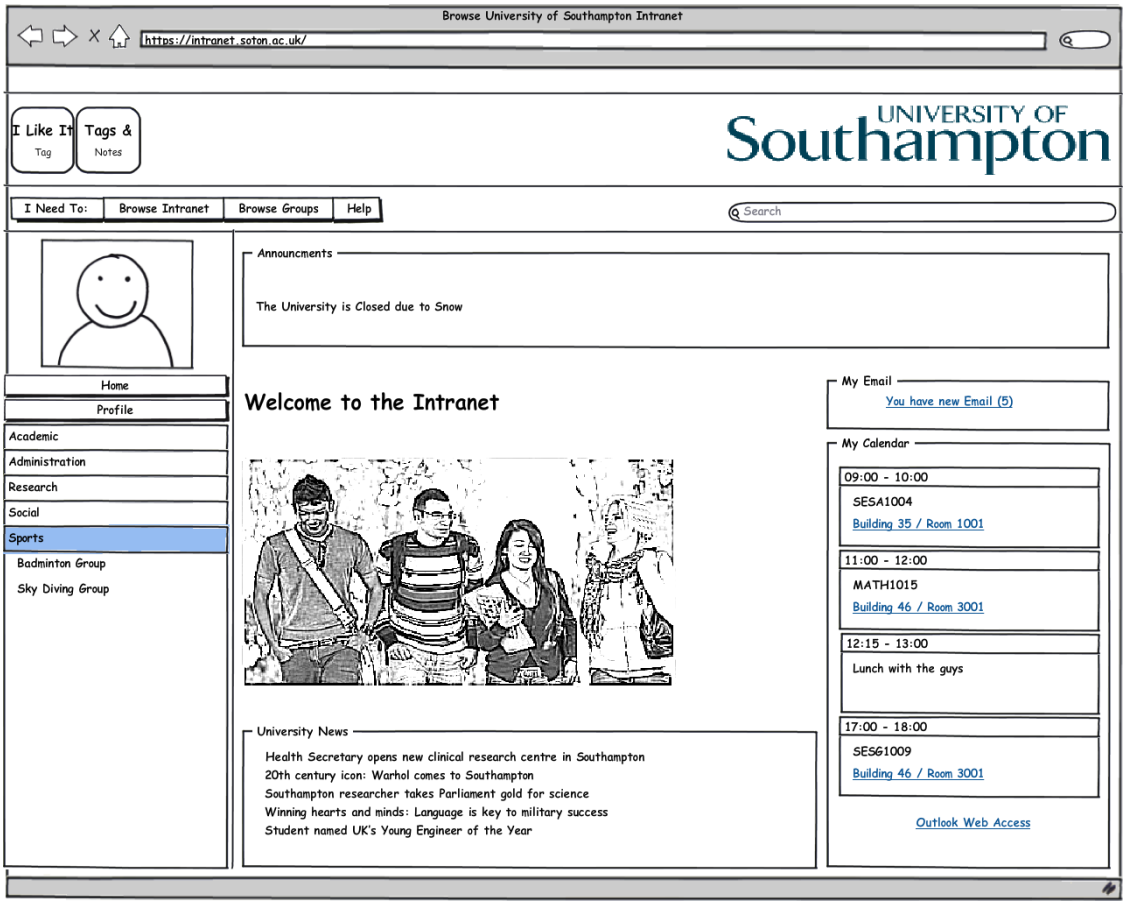

Figure 6. Storyboard from Fig 5 authored as a storyboard in Balsamic

Secondly, the user has a Profile page that contains basic information that all other users can see (all links to people come to this profile page). In addition when they view their own profile we can present additional aggregated information that we hold about them from our various systems.

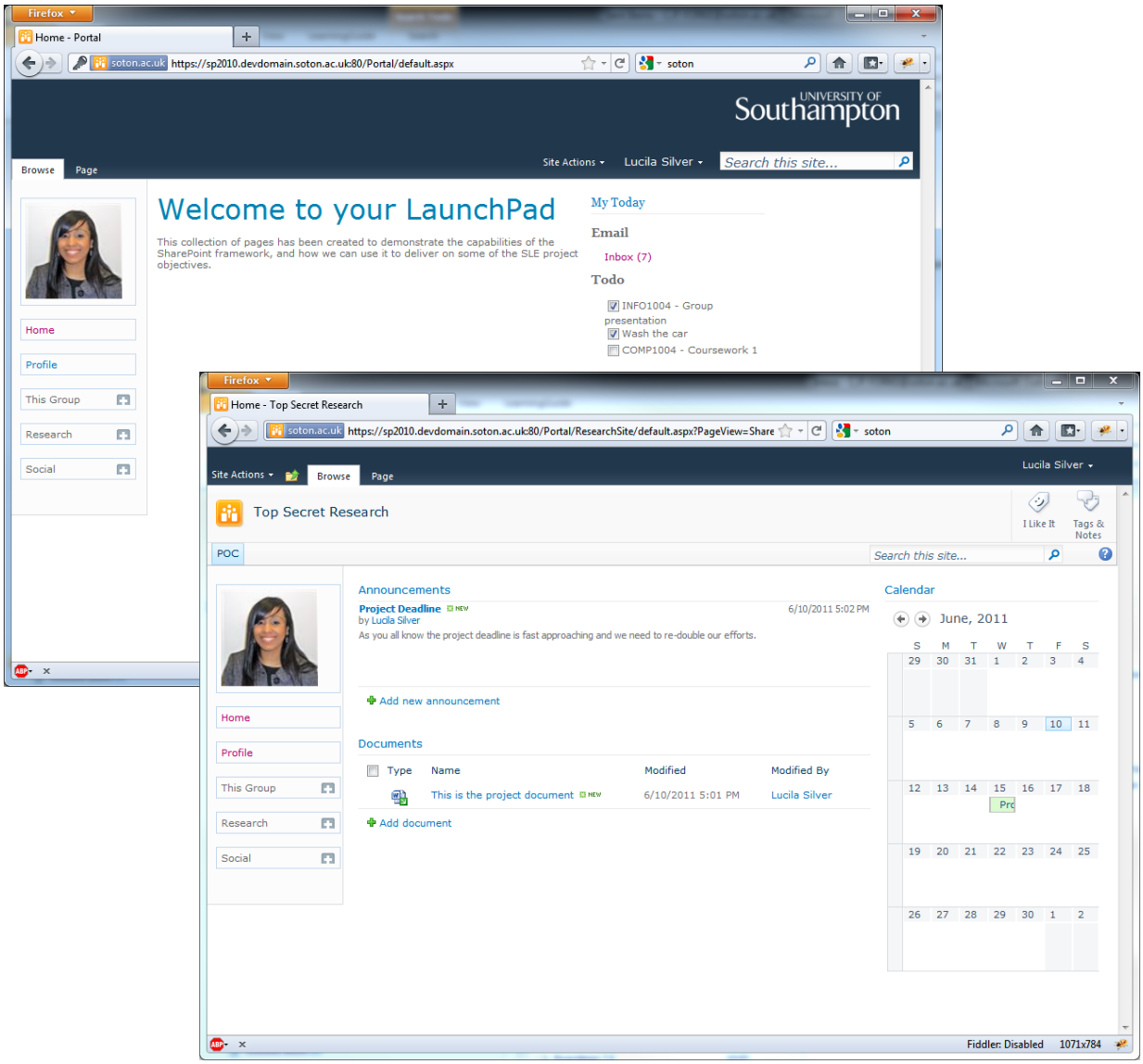

Figure 7: Screenshot of prototype system. Top: Personal Launchpad, Bottom: Example Group Page

Thirdly there are the group pages. The system auto generates important groups for users (such as cohorts, admin units and research groups) but they are also free to create their own at will. Because the portal is based on SharePoint we have a rich set of tools that we can easily make available through our app model, and we can activate some of these by default on some groups. Examples include shared document spaces, wikis and forums.

6. Future Work

We currently have a working prototype and are continuing to work with co-design throughout the Summer to create an initial beta product for limited roll-out in the first Semester of 2011/12. Our deployment strategy is to extend our co-design plan to co-deployment, and initially work with a limited number of user groups to iron out bugs and identify priority feature requests. We have identified around one thousand users who will be part of this deployment, including several different student cohorts, a handful of academic and teaching staff, a research group, library group and administrative group. Our hope is that this diversity will give us the breadth of

feedback that we need to improve the system, and that the users will go on to be champions for the system within the wider organisation.

At Southampton we have already made significant progress with Open Data through our Open Data Initiative[1], however there are a number of key challenges with including Open Data throughout institutional processes and we also have a need to manipulate more protected data in our work on the SLE. To help identity and differentiate our data we are currently preparing to do an initial survey of our systems to prepare a partial Enterprise Architecture Model that will show what data is held where and in what system and/or format. This should then help us to integrate this data with the SharePoint infrastructure (so it because available to sub-systems such as the notifications system and will transform the profile page into a personal information dashboard). Where possible (i.e. where privacy concerns allow) we would also like to export this data as RDF, where it will become available to the other public tools being developed in the Open Data initiative.

Exporting some data publically has an additional advantage in that it provides a useful data-source for third party apps (that can be hosted within a web-part in the portal, but will not be able to access the protected data underneath). Our eventual aim is to open up our app library and allow students and staff to write their own apps that use this non-sensitive data, and then share those apps back with the University community. This will require us to manage a submissions process that tests for quality, but the emphasis on non-sensitive public data should both make this process simpler, and encourage integration with a wider range of third party tools (such as bookmarking sites, or social tools like Twitter).

7. Conclusions

In this paper we have outlined the approach that we are taking in redesigning our teaching and learning infrastructure into an Institutional PLE.

Political challenges include creating a culture of transparency, openness and access (open by default rather than closed by default), and overcoming the reluctance to enable student choices (we see this as empowering students but it also increases the complexity of support, and can create an uneven student experience).

Technically the key challenge is in opening up many different proprietary (and occasionally bespoke) systems, enabling single sign-on across those systems, and supporting personalization and aggregation in a scalable way.

Conceptually the challenge has been in creating interface metaphors that can both empower students and provide them rapid access to important information, but which do not overwhelm them with choices, and that are simple enough to be appropriated for their own uses.

We have described how our on going consultation and co-design have led to prototype development, and that we are aiming at an initial beta release of the new Southampton Learning Environment at the end of the Summer (to be initially run in parallel to the existing University portal). Our co-design process (made up of a large-scale student survey, smaller focus groups and one-on-one interviews) has revealed a preference for a small number of key services in our initial launch (including email and timetabling). These will be built using an extensible App Store model. The Co-design has also highlighted the importance of groups and community and perhaps the biggest departure from other approaches is that we foreground these in our own

[1] Southampton Open Data: http://data.southampton.ac.uk/

interface and make them the lens through which students and staff access all of the data and services of the institution.

Our hope is that the SLE will be a new type of institutional environment that is more open and flexible, provides a platform for future development, works with the individual PLEs of staff and students, and yet also allows the institution to add value to their collective experience.

8. Acknowledgements

The work described in this paper has been made possible by the large team of people at the University of Southampton who have worked on the SLE over the last eighteen months, particularly our colleagues in iSolutions and critical friends on the Technology Enhanced Learning Board.

9. References

Aviram and Eshet-Alkalai. 2006. Towards a theory of digital literacy: three scenarios for the next steps. *European Journal of Open, Distance and E-Learning*

Casquero O, Portillo J, Ovelar R, Benito M, Romo J. 2010. iPLE Network: an integrated eLearning 2.0 architecture from a university's perspective*. Interactive Learning Environments*, vol. 18 (3) pp. 293-308

Eshet-Alkalai. 2004. Digital Literacy: A Conceptual Framework for Survival Skills in the Digital Era. *Journal of Educational Multimedia and Hypermedia* vol. 13 (1) pp. 93-106

Frand J. 2000. The Information-Age Mindset. *Educause Review* Sept/Oct pp. 15-23

JISC 2007. In Their Own Words*. Key findings from the the JISC Learner Experiences studies*. Available from http://www.jisc.ac.uk/intheirownwords (last accessed, June 2011)

Grudin, J. and Pruitt, J. 2002. Personas, Participatory Design and Product Development: An Infrastructure for Engagement. *Proceedings Participatory Design Conference (PDC)*, 144-161

Millard, D., Howard, Y., Gilbert, L. and Wills, G. 2009. Co-design and Co-deployment Methodologies for Innovative m-Learning Systems. In: *Multiplatform E-Learning Systems and Technologies: Mobile Devices for Ubiquitous ICT-Based Education*, IGI Global.

Prensky. Digital Natives, Digital Immigrants. 2001. *On the Horizon (MCB University Press)* vol. 9 (5)

Razavi M.N. and Iverson L. 2006. A grounded theory of information sharing behavior in a personal learning space*. Proceedings of the 2006 20th anniversary conference on Computer Supported Cooperative Work CSCW 06*, pp. 459-468

Sclater N. 2008. Web 2.0, personal learning environments, and the future of learning management systems. *Educause Research Bulletin* (13)

Severance C., Hardin J. and White A. 2008. The coming functionality mash-up in Personal Learning Environments*. Interactive Learning Environments* vol. 16 (1) pp. 47-62

Sharples M., Jeffery N., du Boulay J. B. H., Teather D., Teather B. and du Boulay G. H. 2002. Socio-cognitive engineering: A methodology for the design of human-centred technology, *European Journal of Operational Research* Volume 136, Issue 2, 16 January 2002, Pages 310-323

Van Harmelen. 2008. Design trajectories: four experiments in PLE implementation. *Interactive Learning Environments* vol. 16 (1) pp. 35-46

White S. and Davis H. 2011. Rich and personal revisited: translating ambitions for an institutional personal learning environment into a reality. *The PLE Conference, Southampton, UK.*

Williams and Rowlands. 2007. Information behaviour of the researcher of the future. *British Library / JISC Study*

Wilson S, Liber O, Johnson M, Beauvoir P, Sharples P, Milligan C. 2006. Personal Learning Environments: Challenging the dominant design of educational systems. *Journal of eLearning and Knowledge Society*, vol. 2 (1) pp. 173-182