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# Personalisation in presentation services

*A report commissioned by JISC*

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## Executive Summary

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The activities conducted during this study, commissioned by the UK Joint Information Systems Committee (JISC), included a literature review, interviews, three regional workshops and an email questionnaire which received responses from several European countries, Australia and the USA. The report concludes that personalisation is effective and feasible in situations where data is controlled and where there is a clear rationale or business case. It identifies several impediments to using personalisation with uncontrolled data, including immature technology and lack of metadata. Personalisation is no substitute for user requirements analysis and user-centred design. In the right circumstances, personalisation can improve efficiency, reveal inadequacies in business processes and allow services and learning materials to be effectively targeted. Accessibility to users of all abilities may be improved by offering options such as switching off graphics, or changing font-sizes or background colours – all Web sites should consider this. True personalisation is more than allowing users to “re-skin” the interface or change the position of screen elements.

The report identifies a number of areas where interesting and rewarding work might be done. It does not recommend setting up national services for personalisation or user profiles and it discourages the development of national standards in an area where international de facto standards are still developing. It recommends work on sharing user profiles between services and institutions and also recommends work looking at the use of different profiles for an individual user in different roles or different areas of life (work, home, sport, leisure etc). It also recommends that institutions use the push for personalisation to ensure that their core data and processes are reliable and efficient, and where they are not to transform them. It recommends the use of a common vocabulary for describing personalisation work in the UK academic community and recommends the use of consistent standards throughout the community for the use and production of RSS (newsfeeds). The report recommends that every effort should be made to capitalise on JISC’s substantial investment in services and resources. Users may want to use resources through personalised institutional portals or through personalised subject based services. Re-use and multiple use of records and resources available to the UK academic community should be encouraged. To provide personalised services, institutions and subject based services must easily be able to access and share resources. The authors are doubtful of the value of promotion to end users of arcane and hard to comprehend brands such as the RDN (Resource Discovery Network). Promotional activity would be better focussed at service providers, whether institutional or subject-based, encouraging them to use the indisputably valuable resources that comprise the RDN. This applies to JISC services in general. While a multiplicity of interfaces is inevitable and desirable for progress, competition between government funded services for end-user “hits” which leads to restrictive practices and discourages sharing is undesirable. Assessment measures and performance indicators which encourage such restrictive practices should be removed or reformed.

# Keywords

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personalization, personalisation, user modeling, presentation services, user profiling, adaptive, user modelling, customisation, customisation, customising, interface, customizing interface, portal, personal interface, further education, higher education, JISC, gateway, Web services

# Acknowledgements

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Particular thanks are due to Grace de la Flor who shared with us pre-publication material and to Chris Awre who supported us knowledgeably through the process and whose flexibility allowed us to concentrate on the work in hand.

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# I Introduction

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## I.1 The call and its background

This paper was written after a successful tender responding to a call<sup>1</sup> from JISC (the Joint Information Systems Committee). JISC fund research, services, collections and projects for the UK academic community. Many of these have been considering personalisation as a possible element in their presentation services. Some are using elements of personalisation, other are experimenting with it.

## I.2 The wider background

Internet users increasingly experience personalisation as they consume, buy, search and browse. Services present themselves using personalised interfaces from the minimum of using personal information to provide a “friendlier” greeting – “Welcome, Jane Smith” – to suggesting new purchases based on your past ones, your browsing and searching patterns and the purchasing behaviour of others. Suppliers of software solutions tell us that their customers (and by implication, though this is less certain, their end users) are demanding personalisation. What these demands mean, and the precise functions and utility which people perceive flowing from this personalisation, is unclear. It may be that, rather like the pressure for every business to “Get a Web site” a few years ago, these demands have a poorly formulated and specified rationale. Nevertheless there seems little doubt that, having seen personalisation at work on Amazon and eBay, many commissioners of information systems are saying to suppliers “we’d like that on our Web site”. In academia, there are conflicting claims to be the “one place to go” from library system suppliers, MLEs (Managed Learning Environments), a variety of services, private and public, national and international and, increasingly, Institutional Portals.

## I.3 Terminology and definitions in this study

We supplied a definition list to help discussion during interviews and meetings. This “Base Definition List” with explanatory notes, appears in full in Appendix I. Briefly, we distinguish between Customisation, where the users have responsibility for customising their own experience, and Adaptive Personalisation where the availability of options, interface, access or functionality is based upon knowledge about users gained from tracking user activity and/or other sources of user information. Most JISC services seem to be providing customisation rather than adaptive personalisation. During the process we found it useful to further distinguish between Adaptive Personalisation based on User Activity (APUA) and Adaptive Personalisation based on Data held elsewhere (APOD).

We speak throughout this document of the UK academic community. By this we mean the community who are exposed to JISC funded projects, service and resources: Adult and Community Learning (ACL), Further Education (FE) and Higher Education (HE). JISC’s remit does not currently cover schools and when we speak of the UK academic community we exclude schools for the purpose of this report.

Technology and education between them have spawned their fair share of acronyms – we have attempted to mitigate the worst effects of this by ensuring that each acronym is expanded at least once in the text and also listed in Appendix 4.

## I.4 Authors

The three authors of this study come from a variety of backgrounds encompassing further and higher education, research and services, publishing and software development. Short biographies may be found in Appendix 5.

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<sup>1</sup> The full call may be examined at: [http://www.jisc.ac.uk/index.cfm?name=funding\\_personalisation](http://www.jisc.ac.uk/index.cfm?name=funding_personalisation)

## 2 Target Audience

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We expect the audience for this report to be the JISC staff and committee members; members of the UK academic community including those involved in institutionally funded projects and services and those working on JISC-funded projects and services; those from outside the UK who are working in a similar area; and those who are involved, albeit at an early stage, in the development of the Common Information Environment<sup>2</sup> (CIE) within the UK.

The report is aimed primarily at those involved in strategy and provision, including developers and implementers. It is not a survey of the latest breaking research in the area and is not aimed at active technical researchers developing new personalisation technologies. We have been concerned more with focussing on the potential for provision, development and application in the short to medium term.

## 3 Methodology – the way we did the study

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### 3.1 Literature review

We conducted a search of bibliographic and Web based resources covering the whole subject area, concentrating on applications of personalisation technologies which have potential applicability in the UK academic community. As part of this process we also reviewed information relating to software tools and products (both commercial and open source).

### 3.2 Face to face interviews

We conducted several targeted face to face interviews to discuss issues in depth and to allow us to take advantage of demonstrations and access to key people. These interviews were subsequently written up and approved by the participants – the issues arising and lessons learned by us have been incorporated into the text.

### 3.3 Regional workshops

We held three regional workshops one each at the University of Edinburgh, hosted by EDINA, The City of Bristol College, hosted by the Western Colleges Consortium, and Centrepoin, London, hosted by JISC. The participants were all invited and represented a selection of people active in the UK academic community in the following areas: teaching and learning, libraries, institutional portals and service provision, national service provision, research projects, IT support, development and implementation, user testing and design. The focus of the discussion was, as one might expect, somewhat different at each of the workshops. In Edinburgh, following a presentation by Katie Anstock from Talis, much of the discussion was about the presentation of personalised information via an institutional framework. In Bristol, following presentations by Jasper Tredgold from the Subject Portals Project (SPP), Paul Browning from the University of Bristol Portal project and Andy Powell from UKOLN, the focus was more on information retrieval and subject-specific services, although there was also some very interesting discussion on the difference between information services and information processes at FE and HE institutions. In London, following presentations from Anne Ramsden on the Open University's pilot portal, Tom Franklin on Connect and Paul Miller on the JISC Information Environment Architecture, discussion was more eclectic including JISC services, personalisation for teaching and learning, students' information skills and strategies and creating open source based institutional portals.

### 3.4 Email questionnaire

An email questionnaire (reproduced in Appendix 3) was sent to a number of correspondents whom, for reasons of geography or other constraints, we had not been able to interview or who had not been able to

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<sup>2</sup> see [http://www.jisc.ac.uk/index.cfm?name=wg\\_cie\\_home](http://www.jisc.ac.uk/index.cfm?name=wg_cie_home)

attend the workshops. This proved a very useful tool in getting input from those outside of the UK. All respondents were given the opportunity to choose not to be quoted, to be quoted anonymously or to be quoted with attribution. Comments in the text are therefore sometimes attributed to a named source and sometimes, for example, to “workshop participant” or “questionnaire respondent”.

## 4 Context

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The methods we used for the study provided us with some contextual insights. These form a backdrop to the study’s subsequent sections.

### 4.1 UK context

#### 4.1.1 Contexts other than IT

*People have written about disruptive technologies. I would describe choice as disruptive governance. It really forces you to change your view of the world. It is at this point that power really shifts. It is like that inversion of magnetic north to magnetic south that scientists talk of, where accountability for the first time really starts to flow downwards. Andrew Turnbull, Cabinet Secretary.<sup>3</sup>*

We were struck by the way that “Personalisation of public services” has become something of a mantra amongst public-sector policy-makers, almost within the period during which we did this study. For example, in Tony Blair’s 23/6/2004 St Thomas’ Hospital speech on the future of public services<sup>4</sup>; and in “Personalisation through participation: A new script for public services”<sup>5</sup>, in which Charles Leadbeater lists 3 “meanings” of personalisation in the context of the provision of public services, all of which are echoed in past and current discourse about the personalisation of information services:

- *providing people with a more customer-friendly interface with existing services;*
- *giving users more say in navigating their way through services once they have got access to them;*
- *seeing users as not just consumers but co-designers and co-producers of a service.*

Leadbeater goes on to compare different aspects of public service provision, according to whether the service is characterised as “traditional public sector”, “new public management” or “personalisation”<sup>6</sup>. It is interesting to note how under this latter category, there is so much resonance with the themes and ideas of this study.

It is too early to say whether this focus on personalisation as a central organising theme for modern public services is just a temporary fad or a more permanent feature. Even if it is only the former we think that a wider range of people in the UK academic community than those whose main focus is on information systems and/or the JISC Information Environment will start to recognise personalisation as a serious policy issue: the view of some in the information systems world that personalisation is a *passé* topic cannot therefore be sustained. It is partly for this wider audience that our report is written.

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<sup>3</sup> Speech on 12 December 2003 to launch *The Adaptive State: strategies for personalising the public realm* (London, Demos, 2003)

<sup>4</sup> Full text of speech, which uses the term personalised no less than 7 times, is available at: [http://newsvote.bbc.co.uk/mpapps/pagetools/print/news.bbc.co.uk/1/hi/uk\\_politics/3833345.stm](http://newsvote.bbc.co.uk/mpapps/pagetools/print/news.bbc.co.uk/1/hi/uk_politics/3833345.stm)

<sup>5</sup> Demos ISBN 1 84180 122 4

<sup>6</sup> Leadbeater’s table showing the relationship between these is shown in our Appendix - 11.7

#### 4.1.2 Features of the UK academic community

There are many similarities between large further and higher education institutions (FHEIs) and other large public and private organisations, but there are also key differences. All large organisations hold personal information about their employees and their customers but a university or college will (in theory) be able directly to relate that data to the information needs of their students. A student's performance will generally be monitored and assessed far more closely and in a more detailed way than that of an employee (though one can think of exceptions – call centres for example). A first year history student will have different information requirements from a postgraduate chemist and many of those requirements can be predicted to a certain extent (reading lists being an obvious non-technical example). The very business of education is exposure to and analysis of appropriate information. FHEIs traditionally have much more scope for using personal information for internal purposes without running into privacy concerns. Compared to, for example, an online retailer, a college should have far more, and more authoritative, information about all of its students than the retailer has about all of its customers.

#### 4.1.3 JISC Information Environment Architecture

During this study it became clear that the JISC Information Environment Architecture (JISC IEA) underpinned many of our discussions - our remit uses the word "Presentation" in a very particular way - and we often found the need to refer to the diagrammatic representation of this architecture created by Andy Powell<sup>7</sup>. We have reproduced the diagram with accompanying notes in Appendix 6. We were fortunate to have presentations from Andy Powell and Paul Miller during our workshop consultation process.

The layered diagram of the JISC IEA shows a range of components in a distributed environment. It is not meant to suggest a strictly layered hierarchy (such as the 7 layer OSI Model), it is more a way of categorising components and roles.

The provision layer includes content providers, including academic-based, commercial content via agreements with JISC and other negotiated services; these may be hosted by JISC or by other providers. Institutional content and content available from the Web also appear here.

The presentation layer includes any tools which users use, whether remote (e.g. a portal), or on the desktop, such as an RSS (newsfeeds) aggregator. There is often an assumption that the presentation layer only means portals - this is wrong – it can include anything from mobile phones to Web-based services.

The Fusion layer includes brokers (such as GetRef - <http://edina.ac.uk/getref/> - a bibliographic broker based at Edina), aggregators (such as a metadata harvesting service which makes the data available to a portal), catalogues (such as RDN hubs which make metadata records available) and indexes (such as the ISI Web of science, or Google).

Shared infrastructure might include authentication, a service registry to tell services about other services and a trusted way to get systems to talk to each other.

Services may span 2 or more layers of the diagram. The JISC IEA aims to supply a set of standards to enable software/machines in different places in the JISC CIE to talk to each other properly. The underlying standards are documented in the JISC Information Environment Architecture Standards Framework:

<<http://www.ukoln.ac.uk/distributed-systems/jisc-ie/arch/standards/>>

#### 4.1.4 Institutional portals

There is a significant push in the UK, as elsewhere, towards creating institutional portals, a term whose definition varies widely. The essential characteristic is that the portal provides access to a variety of materials or services, originating from inside and outside the institution, through an interface provided by the institution.

*An institutional portal should be seen as a framework for the delivery of services. The portal knows who you are, and what you can see is defined by that, so that you as a user see your address, your HR record, your exam timetable, and your HESA census data.* Interview participant.

There is currently a division between those working to create so called "thin portals" – where relevant content and services are gathered together in one place but the portal identity may be lost once the user accesses a

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<sup>7</sup> The original may be seen at: <http://www.ukoln.ac.uk/distributed-systems/jisc-ie/arch/> where there are links to explanations of many of the elements therein.



particular resource - and “fat portals” where everything, including external services which usually have their own interface, is transformed to be displayed within the portal’s own interface and identity.

*A thin portal provides doorways into other applications, such as to the home page of the learning environment, or quite deep within it, or to “today” in the institution’s calendar application. Workshop participant.*

The motives for establishing institutional portals are varied. Some claim that portals achieve streamlining of business processes with time saving, for students and staff “*Look: there are no queues at the registry in the first week of term – how much is that worth?*” Personalisation is often seen as a key element in this improvement. Clearly if the institution can provide a tailored service to students, filling in many of the blanks and saving the enormous duplication that is characteristic of multiple registrations (at registry, faculty, department, course, library, sports centre, medical centre, careers service etc) this is an indisputable efficiency gain and a clear justification for personalisation. Others feel that an institutional portal is part of the institution’s branding process. In this scenario personalisation may be seen as the “Wow” factor – demonstrating the up-to-date technical capabilities of the institution, or as a means to maximise the extent to which content and services, of whatever origin, seem to the user to be provided by the institution. Others see an institutional portal as a way of controlling the content (type of content, quality of content, cost of content) put before their students and staff. In this case, personalisation tailors the level and extent of access rights accorded to users depending on their job / role, course, subjects studied etc. Finally, some see a personalised portal as means of finding and correcting “holes” in the institution’s data management<sup>8</sup>.

*If users are in the “wrong place” in the MIS, then they may be denied access to a service they need. Of course the converse of this is that if you know that a user is denied a service they should have, this shines a powerful light on the MIS. Interview participant.*

Whatever the motives there is a definite, but not yet decisive, move towards creating institutional portals. This move creates demands – the institutions want to be able to use and reuse resources and services which have been funded for use by the academic community<sup>9</sup>, and they may need to integrate core (and often legacy) systems, such as MIS, library catalogues, and learning environments within their portals.

#### **4.1.5 Learning environments**

The two market leaders in the FHE learning environment market (Blackboard and WebCT), as well as open source learning environments like Moodle or Claroline, claim the capability to interface with campus portals and with authorisation and authentication services, though it must be said that those we spoke to who are using them for this kind of portal integration found the process difficult and the capabilities somewhat limited.

At least some use of Rules Based Filtering is practically an inherent feature of all learning environments, in that the specific content and services to which a user has access are shaped by preset rules about relationships between items and user profiles. Some learning environments also offer customisation, at varying degrees of complexity. For example the current version of the Ufi/learnirect learning management system allows users to add personal URIs to their homepage, but offers no control over its look and feel. A future release of the Ufi/learnirect learning management system will allow a 3<sup>rd</sup> party user of content from the system to customise the content “in the colours of the 3<sup>rd</sup> party”.

More complex customisation, in which one class of user (teacher) can customise a service so as to provide personalisation for another class of user (learner) is provided by at least one of the market leading learning environments:

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<sup>8</sup> One workshop participant described a feature of an institutional portal (demanded by staff when the portal was being specified) which enables teaching staff to obtain details of the students on courses they teach by picking from lists of courses in the portal. As a result the “centre” of the institution is able to find out which academics are teaching which courses!

<sup>9</sup> It is worth noting here that this issue of reuse is important outside of institutional portals – subject based portals and portals based around media types or specific user groups or geographical areas or other criteria will all require resources and services to be made available in a standard format. For personalisation to work, a prerequisite is that existing projects, services and collections are made available to a variety of existing and as yet unforeseen applications. In order to create such a permissive environment, both technical and intellectual property hurdles need to be overcome.

*Using information specific to a student, instructors can ... automatically release content to students that meet certain criteria. For example, instructors can release content to students based on participation in a learning group. Or, instructors can use a student grade on a particular assessment, assignment or combination of grades to determine what content should be available to aid that student's learning. More advanced instructors can even ... construct an online course that automatically releases content to students based on a certain learning style preference (auditory, visual, etc). Instructors have tremendous freedom to create online courses that automatically adapt to a student's needs. Questionnaire respondent.*

Interestingly, the approach described above sidesteps, by using a customising (human) agent, the technical difficulty of “true” Adaptive Personalisation within a learning environment, a point made by several questionnaire respondents and workshop participants.

*.... the ultimate vision of a personalised learning pathway for every learner according to their unique learning needs will require extraordinarily rich metadata if intelligent software is going to be even vaguely accurate at selecting the right content at the right time. The cost implications of this metadata are not yet well understood, and in my view, may make the personalisation argument cost prohibitive for all but the most well understood and universally studied topics (e.g. school maths may have a positive ROI for massive investment in metadata, but minor elements of Australian history may not). Professor of Learning Technology, James Dalziel. Response to questionnaire.*

#### **4.1.6 Library systems and services**

Like many other systems in use within FHEs, library management systems offer some services, such as OPACs, which can be used anonymously and others, such as reservations or inter-library loans, which rely on information about the user's identity. Historically, Library Systems maintained their own database of users but, increasingly, this is being integrated with other campus systems by the use of e.g. LDAP directories. At the moment, integration is often limited to a periodic import of user data from third party sources rather than 'real-time' integration. There are a variety of practical reasons for this. For example, libraries often serve a broad constituency (including Alumni, for example) whose details can't easily be accessed elsewhere. Also, institutional directories often only store individuals' institutional email addresses (.ac.uk), whereas for reminders, overdue notices, etc. libraries need to use the email account that users actually make use of. For many students, this is a personal Hotmail or Yahoo mail account.

There are increasing demands being placed on vendors of library automation products to incorporate personalisation into their products. One comes largely from the public library sector which is keen to introduce Amazon-like features, including cover art, reviews and recommendations, into their OPACs. Many public libraries apparently view themselves as being in direct competition with the likes of Amazon.

More directly relevant to the UK academic community is the demand to integrate access to a variety of electronic databases and eJournal subscriptions into a single interface. If a system is aware, for example, of what course a student is on, then it can present a tailored list of search targets for resource discovery and use technologies such as OpenURL resolution to present the appropriate copy of a particular resource.

A brief summary of the main products in use in the UK academic community is provided in section 5.2.1.2.

## **4.2 Wider context**

### **4.2.1 Commercial systems (see also 5.1.1.2 below)**

If you buy something on the Internet, from a filter plug for your ADSL connection through music and books to a car or a house, you will be presented with elements of personalisation. How people react to these elements seems to vary widely. Some object wholesale to insincere greetings messages and inappropriate use of their first name. Others claim that the systems don't match their needs:

*Customers don't want relationships with corporations. As I smile at the sound of the store attendant's greeting, I'm actually responding to a person. I'm certainly not responding to a corporate message, and I certainly don't want warm personal "relationships" with the 100 retail businesses I use most.*

<http://www.shorewalker.com/hype/hype60.html>

*Nothing annoys me more than if the program thinks about what I would like and produces something I don't like. Peter Gietz, DAASI.*

*Systems can guess but when they fail it is really a nuisance ... The best personalisation is to build simple and very powerful tools, which can be used separately and share a common logic and UI look and feel ... Then there can be customisation options ... and academic people like suggestions not rules ... people who read/searched/did this also read/searched/did this lists. Lassi Nirhamo.*

Most of the people we spoke to during this study agreed that it is more irritating than useful to know that the last person who bought a filter plug also bought 3.5 metres of cable and clips. This problem emanates from what Jared Spool calls "indiscriminate attention". "

*It's nice at times for a third party to pay attention to certain interests and make recommendations. For example, if you go to a restaurant regularly, and a waiter knows you like a certain salmon dish that is sometimes available as a special, it's nice for the waiter to point that out. But you probably don't want that same waiter to start commenting on your recent choice in friends.*

<http://www.nmpub.com/blog/archives/000030.html>

A significant number (probably not a majority) spoke in favour of system suggestions for future purchases, particularly in the area of books and music, where several had bought items on the basis of system suggestions and were happy with the results. Some were convinced that books and music were a special case and that people will only bother to contribute reviews and ratings in an area of passionate interest rather than an area of work or study.

At first glance it seems that the world of Web commerce has already produced solutions which allow personalisation and implemented them widely.

*The public sector is five years behind and the gap is growing. Workshop participant.*

Some of the people we spoke to thought that this meant that we were wrong to question whether and where personalisation is necessary, taking the view instead that it is already here and will soon become pervasive. Others, however take a very different view:

*I think this topic is still very much in the research phase and premature for practitioners to consider. Professor of Computer Science, Michael M. Danchak.*

*While we need to continue to research this area to some extent, I think much of the focus on this area is misplaced given my concerns above about the problems of realising the personalised single learner pathway concept ... I think the next year or two may see a major shift away from personalisation in e-learning as the "big idea", and in favour of "collaborative learning activity sequences". Professor of Learning Technology, James Dalziel*

What are we to make of this discrepancy?

We believe that personalisation has succeeded in commerce where it fulfils a core function for the business and where the task (although not necessarily the technology) is relatively simple and well defined. In eBay for example, if you are using the service as a seller to produce a regular source of income (and you are the lifeblood of the service, without you it will not work) then you obviously require to see the history of your past sales, state of bidding in current auctions, payment history etc. This is not an improvement or enhancement to the service, it is an essential ingredient. For Internet banking and financial services it is very similar - it is self evident that an accurate personalised data display is vital to the business. For a service like Amazon, however, the argument is not so clear cut. When pushed to come up with a success story for personalisation most people cite Amazon. Is Amazon not creating a new market using personalisation? Is it not using the technology to increase its sales in an innovative way which is unique to the Internet? In the face of the success of the brand and the ever increasing sales it would be contrary to deny it. Is this core to Amazon's business or a clever add on? Many of us are old enough to remember bookshops where the staff were knowledgeable enthusiasts, more than willing to spend time getting to know you, debating the merits of different titles and authors and pointing the customer to new delights. The mass marketing of books and the rise of the large chain bookstore has made this sort of shop very rare, and to some extent Amazon has come to take its place - we value a place where we can browse quietly, undisturbed, occasionally surfacing to get a small but appropriate piece of advice. Perhaps Amazon is a very old fashioned service and personalisation (along with cover pictures, reviews etc) is a vital tool used to accomplish it. For libraries to emulate the success of Amazon comparable, and possibly unaffordable, personalisation features would be needed.

*For example, it is not possible to establish a personal relationship between yourself and a bookseller like Amazon.com. There are no people. There are no salesmen. By providing "intelligent" user interfaces to*

goods and services, some businesses are overcoming these limitations. Online businesses are playing a significant role in changing user expectations when it comes to online experiences. Other things play a role in these changing expectations as well. For example, the sheer numbers of people who use the Internet make it easy to find other people like oneself and discuss increasingly specialized issues. While we are becoming more homogenized we are also becoming more specialized. People are bringing these changing expectations to my library. They are saying, ... "Library, you already know who I am because I have to log in before I can use your services. After I grant you permission, why don't you remember me, keep track of what I do, and offer suggestions? After all, I did such a thing previously when I visited you in person. Ms. Peabody was very helpful when she..." ... if libraries do not provide the products and services people need and desire, then the funding for libraries will dry up. Eric Lease Morgan. Response to questionnaire.

It is stating the obvious to say that in business, personalisation works where there is a clear business case. It should be equally obvious that any application of personalisation in education should have a clear and defined business case. Research and development activity, in both areas, can be less driven by specific objectives, as long as the organisation can clearly distinguish between r&d and application.

#### 4.2.2 User requirements (see also 5.1.1 below)

We have found little if any systematic user requirements analysis in this field – presumably the major commercial players have conducted their own which is regarded as commercially sensitive. It seems that personalisation is often considered to be an alternative to user testing, with the rationalisation that if the interface, the options and the data are sufficiently flexible the user will choose the most suitable elements. This argument does not convince us. We prefer to agree that:

*The majority of UM [user modelling] literature addresses technical frameworks and modelling techniques with scant reporting of user testing. According to Chin (2001) "A quick scan of the first nine years of UMUI [user modelling and adaptive user interfaces] reveals that only about one third of the articles...includes any type of evaluation. This is much too low of a percentage". Further research on the usability of UM and its effect on technophobic and inexperienced users would greatly add to the understanding of how users perceive and react to such systems and may improve its further development and uptake. de la Flor (2004)*

and, in more robust terms:

*Rather than spending extensive resources on personalization, Web designers should:*

- o *run usability studies*
- o *structure the site according to the user's view of the world*
- o *write content that is optimized for the online medium*

*Of course, these steps do not have the magic ring of "let's fix it with some cool technology", but they do have the advantage of working every time (and being cheaper, too). Jakob Nielsen's Alertbox for October 4, 1998*

Things have changed since 1998 and we may argue about the relative costs, but the fact remains that developers and those who commission systems tend to be more interested in “cool technology” than in prosaic user testing.

#### 4.2.3 Personalising information from the bottom up

The brief for this study focuses on “presentation services” but we must mention that personalisation can take place outside of the large service context. Email was mentioned more than once as being a personalised medium, Tom Franklin insisting that “push technologies” are a key part of personalisation. The “bottom-up” approach to personalisation can take a number of different forms. Social networks like FOAF <<http://www.foaf-project.org/>> require personalisation to fulfil their core function and to provide a meaningful end-user interface to the network. Since the mapping of personal relations is one of the main features of social networks, personalisation needs are inherent. Indeed, within the context of adaptive personalisation, a FOAF-like tool like could be used as a ‘recommender system’ and thus as an alternative to collaborative filtering algorithms.

Peer to peer networking, though popularly portrayed as subversive and pseudo-criminal by the media and others who have a vested interest in such a portrayal, is much more than merely a threat to the recorded music industry. It has the potential to allow a high degree of user control over personalisation of information, communication and entertainment, a fact which has been recognised in academic projects like Lionshare

<<http://lionshare.its.psu.edu/main/>> which aims to facilitate legitimate file-sharing among individuals and educational institutions.

While one of our respondents warns that:

*Adaptive personalisation tends to have a connotation of "Big Brother is watching you". Users should be able to turn such features off.* Questionnaire respondent

it could be argued that adaptive personalisation in a peer to peer environment might turn this argument on its head, by giving the end user ultimate control over incoming and outgoing traffic

*The original Internet was fundamentally designed as a peer-to-peer system. Over time it has become increasingly client/server, with millions of consumer clients communicating with a relatively privileged set of servers. The current crop of peer-to-peer applications is using the Internet much as it was originally designed: as a medium for communication for machines that share resources with each other as equals.* Oram

Weblogs or blogs are another example of bottom up personalisation. Whole communities with complex structures, idiosyncratic rules and mores are developing and personalisation is a key element in these communities. Blogs can certainly be an element of larger services, particularly in a collegial environment although

*Weblogs go some way but not everyone wants a soap-box. Software enabling "personal digital repositories" is another dimension that would be very useful -- such repositories could be the means for fast-tracking the development of larger institutional repositories or "community of practice" collections. The e-portfolio movement has some potential but has been sidetracked by the "personal transcript" interpretation of such an application. ... Could a service evolve as a result of leading practice? Take a good look at the vibrancy of the various communities using blogs & syndicated content. ... Think outside the box of "delivering a service" -- it's almost always too top-down in conception. Could a service evolve as a result of leading practice?* Questionnaire respondent

The boundary between the service approach and the bottom-up approach becomes blurred when a social networking service is highly centralised with restrictive data ownership conditions, for example Google's Orkut <<http://www.orkut.com/>>

## 5 Literature Review

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### 5.1 Summary of sources

#### 5.1.1 Research Literature

##### 5.1.1.1 *User Modelling & Usability* (see 4.2.2 above for discussion on user requirements)

The genesis of much of the work on personalisation and adaptive user interface lies in work conducted by researchers into artificial intelligence, starting in the 1980s. This remains an active area for academic study within the Human Computer Interaction (HCI) community. The main rationale for the construction of user models is to allow systems to adapt to user needs and therefore enhance the user experience. This utopian goal has been hijacked to some extent by commercial interests who use the technologies to 'push' information at sometime unsuspecting users. Benyon & Murray [LR01] review the early work in this area and identify common approaches and architectures. Although over 10 years old, this is still a useful primer for the area of study.

A more up to date state of the art review is provided by de la Flor [LR02]. Noting that the benefits of adaptive interfaces based on user models include increased control (of the application by the user) and an enhanced user experience, she reviews techniques for the acquisition of data from which to construct models. These include both implicit data (server logs, cookies, etc) and data explicitly supplied by users (age, gender, location, etc). It is worth noting that, in the FHE context, there is potentially a rich source of user data already held in

various institutional systems. Utilising this data may help overcome the reluctance to fill in on-screen profiles, etc. but this must be balanced with concern for privacy issues (see below).

de la Flor also reviews the major pattern matching models used by systems to create user stereotypes and assumptions which are in turn used to create associations between items and users. This process, as applied in ecommerce (see 5.1.1.2 below) is essentially identical to what would be required for a personalised service in the context of the JISC Information Environment (see 5.12.2 below).

### **5.1.1.2 eCommerce** (see 4.2.1 above for discussion of commercial context)

The application of personalisation technologies to commercial Websites was a feature of the 'dot com' boom of the late 1990s. Following on from pioneering work by Amazon, virtually every retailer and service provider with an Internet presence began to implement a personalised 'my.xxx.com' interface. In the world of eCommerce, personalisation is commonly achieved using collaborative or rules based filtering, either singly or in combination. These approaches draw directly on the academic research into user modelling outlined above. A central plank in constructing user models is the tracking of user behaviour, often by the use of so-called 'tracking cookies'. Whilst this form of covert analysis of user behaviour is still widespread (the BBC, for example, makes use of 'Red Sheriff' tracking cookies) it has also been widely criticised and the use of 'anti-spyware' utilities such as AdAware is now quite widespread. The industry has responded by setting up code of ethical practice through organisations such as the Personalization Consortium [LR03], which acts as an informal industry body for the Web marketing sector.

Privacy concerns have been one factor in the slowing down of the rush towards personalisation in eCommerce. However, another factor has been the growing body of evidence that, in purely commercial terms, the paybacks from implementing personalisation do not warrant the high costs of implementation and maintenance. An early example of this line of argument can be seen in the article by Nielsen [LR04] who states that money invested in personalisation would be more effectively spent increasing the general usability of sites. Lighthouse [LR05] also question the evidence of effectiveness. Pointing to the many examples of where personalised services have failed or quietly been withdrawn, they conclude that "the oft-cited Amazon personalisation success is not a harbinger of Internet commerce's future, but an atypical example". Indeed, a number of authors have pointed to the intrinsic suitability of books, CDs, etc. to recommender services based on collaborative filtering.

A more wide ranging and damning critique of the current state of play in eCommerce is provided in the recent Jupiter research study "Beyond the Personalization Myth: Cost Effective Alternatives to Influence Intent" (reviewed by Rush [LR06]). This influential study provides evidence from a broad survey of eCommerce applications. Amongst its key findings are:

- 14 percent of consumers say that personalized offers or recommendations on e-commerce sites lead them to buy more often from online stores
- 8 percent say that personalization increases their repeat visits
- most sites that have deployed personalization tools have realized inadequate returns on their investments - a personalized Web site can cost more than four times that of a comparable dynamic site
- where personalization has proven effective is in corporate portals

It is interesting to note that the feedback on the level of take-up of personalized services in eCommerce is supported by evidence from 'public service' providers, such as the BBC.

The case that corporate portals are the appropriate place for implementing personalisation is also taken up by Nielsen [LR07] who argues that "the weaknesses of Internet portals are the strengths of intranet portals". In this context it is worth noting that an institutional portal, if it is using controlled data and therefore could supply specific information to a restricted audience, would qualify as an "intranet portal".

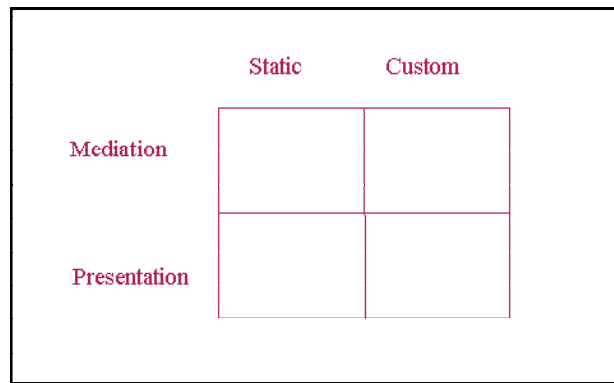
### **5.1.1.3 Portals**

This section deals with generic architecture and design issues relating to the role of personalisation within Internet portals. Reviews of specific features of individual products and toolkits are provided in section B.

As Dolphin et al [LR08] point out "there are as many definitions of a portal as there are purposes to which portals are put". Dempsey [LR09] proposes a 2x2 matrix of portal types:



## A portal grid



In each quadrant (e.g. Mediation/ Static, Presentation/ Custom ...) he identifies different examples of portals. From the perspective of personalisation, it is the 'Custom' column which is of interest. He characterises Library Automation systems such as My.Library as Presentation/ Customisable, indicating that customisation is restricted to the presentation of information to users whereas Metasearch products such as ZPortal are labelled Mediation/ Customisable because customisation can also occur at the mediation level, usually by providing a mechanism for selection of underlying resources to be included in the search.

Sawyer & Bailey [LR10] describe their experience of implementing an institutional portal at Monash University. The theme of matching user profiles to resource profiles discussed in the Digital Library section above emerges strongly in their paper. Monash have implemented an enterprise portal which acts a 'thin' layer, brokering access to resources. Within the HE context, they identify specific data requirements:

### User Profiles:

- Relationship - staff, student, visitor, main campus, department etc.;
- Roles - technical support, financial delegation, first aid, etc.;
- Personal attributes - gender, etc.;
- Interests - research, sporting, social, etc.;

### Resource Metadata:

Three classes of access are defined:

- Push (optional) - include this resource in these individuals' portal pages; or
- Push (required) - this resource may not be removed by these people; or
- Allow/Deny - include/exclude this resource in lists of useful resources for customisation.

At its simplest level, a resource catalogue may provide a link to an existing service. However, the authors explore the use of intelligent interfacing agents providing services such as:

- Authenticating
- Summarising relevant application content
- "Deep linking" (e.g. OpenURL resolution)

Echoing Lynch's description of requirements for user profiles in a distributed environment, Monash decided to utilise an LDAP directory service to store details "drawn from existing information where possible".

Dolphin et al (op cit) describe similar work undertaken at Hull University in setting up an institutional portal and extending this to include a wide range of distributed resources as part of the JISC funded PORTAL project. The authors describe their experience of implementing a uPortal based system. Their view of the portal as a thin layer which brokers access to services is essentially the same as that described by Monash. However, to date, a pragmatic approach to personalisation has been taken with many of the options available in uPortal being deliberately disabled. Concern is expressed about the risk of personalisation options in the user interface "distracting users ... before they get to use a site for the first time". As for personalisation in terms of content, so far, other than access to personal profiles, etc, the main distinction drawn has been between "staff" and "student" users. Again, they express concern about close mapping of user profiles to resources producing "dangerously narrow views on the information landscape, in which a user is only presented with 'interesting' or 'relevant' resources that they have already classified as interesting or relevant, removing the possibility of serendipitous leaps off into related resources".

#### 5.1.1.4 *Digital Libraries*

The Library and Information Retrieval communities provide another important strand in the debate about personalisation. Libraries are an important area of potential application of personalisation technologies. Also, due to a large extent to US privacy laws restricting libraries' use of patron information, the library community is particularly sensitive to privacy issues.

Lynch [LR11] provides an excellent overview of the privacy issues alongside an analysis of some of the 'soft' issues relating to personalisation. Lynch focuses on 'recommender' systems. The exponential growth of information available on the worldwide Web and subsequent difficulties faced by many users when faced with thousands of hits from search engines such as Google, has led to increased interest in systems which filter or rank results for individual users. Lynch distinguishes between systems based on opinions or actions of other 'similar' people, those based on opinions or actions of opinion leaders or people rated as 'respected' by the user and those based on popularity ratings. He also suggests that it is possible to build 'privacy friendly' recommender systems which are scalable and useful, by anonymising recommendation lists submitted by users. His discussion of the role of trusted third parties to hold sensitive user information, although written from a public library perspective, is highly relevant to the UK academic community. Lynch argues strongly that such information should be held close to the user, in a distributed system, rather than in a centralised repository.

In June 2001 the DELOS Network of Excellence held a seminar in Dublin on Personalisation and Recommender Systems in Digital Libraries. The papers presented are summarised on the ERCIM Website [LR12]. Although mainly focussing on technical aspects of collaborative filtering, etc., Finn et al. point out the issues surrounding classification of Web based content. In the discussion of user modelling above, reference was made to matching of user profiles to items. However, these items themselves need to be described in order to be matched. Whilst Librarians are adept at using metadata to describe a variety of resources, the sheer volume of Web content defies classification by users. Whilst attempts to encourage authors to embed metadata (e.g. through the use of Dublin Core meta-tags) have met with limited success, Finn et al. discuss the potential of automatic classification tools with recommender systems. Whilst such approaches are in their infancy and could be regarded as too 'leading edge' for consideration by JISC in concrete service provision, it is clear that some solution along these lines will be essential if the potential benefits of personalisation are to be fully realised.

### 5.1.2 **Contexts**

#### 5.1.2.1 **eGovernment**

In parallel with the interest in personalisation in the context of provision on Internet based services, which has provided the main focus for this study, there has been a recent growth in use of the term in the wider political context when referring to delivery of government services more generally. This trend has already been explored in some detail in section 4.2.4. In a book commissioned by the think-tank Demos, Leadbeater [LR13] likens personalisation to privatisation in terms of being a 'big idea; driving government policy'. This policy drive has been taken up in particular in education with ministers such as David Miliband making speeches promoting 'personalised learning' [LR14]. Demos organised a high profile seminar (sponsored by WebCT) in May 2004 to promote this view of personalisation in FHE.

In relation to the previous technology-based discussion, the term personalised learning is quite loose and could be applied to any self-paced learning. Therefore, at its most basic level, most distance or technology based learning is personalised learning. However, the more radical agenda is to use the mediating technology to enable demand-led changes to the way services (in this case education is merely an example of a service) are delivered. In practical terms, the underlying tools will be the same as those discussed above, however the goal of personalisation is much broader (or, some would say, more nebulous).

Despite personalisation being so high on the current political policy agenda, the eGovernment Interoperability Framework (eGIF) [LR15] has surprisingly little to say on the subject. In theory the eGIF is a major integrating factor in the diverse drive towards eGovernment across both central and local government but the only reference in the entire document to personalisation is to the use of 'transcoding' approaches to allow content to be delivered across multiple platforms (Web, kiosk, mobile phone, pda, etc.). The term 'transcoding', though not currently in widespread use, appears in some early work from IBM research on enabling content to be rendered across a range of devices with differing requirements (see [LR16]). Developments in the use of web technologies such as Cascading Style Sheets and XSLT transformations have led to a large body of



emerging good practice on the use of different 'skins' for both coping with different display devices and for enhancing accessibility. However, in the context of this report, this is often not an example of true 'personalisation' as the display format is usually either auto-negotiated based on the characteristics of the viewing device or selected from a small set of fixed options (limited customisation). APOD would occur if the system determined the appropriate display from a user profile held elsewhere.

An interesting perspective on the role of personalisation technologies in the delivery of Web services can be found in the personal Weblog of Alan Mather [LR17]. Mather is one of the leading thinkers in the Office of the e-envoy and an advocate of personalisation as an important tool in helping citizens locate the information they need. However, he points out the problems of aggregating content classified using different taxonomies and with different standards for updating and maintaining data. He also points out that, for individuals to be willing to provide personal data – or to allow it to be used – there needs to be a perceived benefit – “We are probably far enough ahead to collate data anonymously and add some data based on what we can assume (e.g. from post code), but certainly not smart enough yet to link that to what government genuinely knows about you as a person. So one size fits all is still our model and we're some way off one size fits one.”

A US view of personalisation within eGovernment comes from O'Looney [LR18]. Although he reports that individuals surveyed “indicated a basic level of comfort with their government developing and using profiles based on information that is quite personal”, he also notes the widespread privacy concerns, particularly concerning the sharing of personal data between agencies. He notes that these concerns, combined with cost, have limited attempts to build personalised services. He concludes that citizens will be more likely to accept the use of personal data if they are able to control how much information is exposed and to which agencies.

### 5.1.2.2 FHE

The main context for the application of personalisation technologies within FHE is, of course, the JISC Information Environment [LR19] see 2.2.2 above and Appendix 6 (for a pictorial representation.) This distributed architecture, originally developed for the Resource Discovery Network but enhanced by UKOLN staff over time, has received widespread support as a catalyst for interoperability and has been adopted by a range of public bodies in the UK (as the Common Information Environment). Within this context, personalisation can be seen as a function invoked by components at the presentation layer, in particular portals. However personalisation of 'push' services can also apply at the fusion and provision layer. Personalisation may be embodied entirely within the portal or may rely on interaction with shared infrastructure

One of the most directly relevant reviews of personalisation technologies in relation to application in FHE was conducted by Monica Bonnet of UKOLN in 2001 [LR20]. In addition to reviewing a number of key products and projects, she lists a number of challenges which arise when personalisation technologies, particularly implicit personalisation techniques such as click stream analysis and collaborative filtering, are used. These include:

- the use of controlled vocabularies & profiles
- determining the level at which personalisation should be delivered (group, sub-group or individual). She argues that the if a group of users have relatively homogeneous requirements then it is often preferable to implement personalisation features at the group level
- providing basic and complex customisation options to cater for both novice and expert users
- safeguarding user privacy
- setting measurable goals from personalisation service development

More recently, JISC has funded Bevan & Kincla to produce a foundation study into HCI Design for the FHE sector [LR21]. The study draws strongly on the work of Nielsen (op cit). The authors use the term 'automatic personalisation' to refer to what we have defined as 'adaptive personalisation'. Many of the recommendations are general. Amongst the key recommendations in relation to personalisation are:

- Customising the interface based on the user's role or subject area can save the user time and produce results more closely matching their needs. But be careful not to antagonise user by making incorrect assumptions.
- Users should be able to set personal preferences as defaults by answering questions or selecting options, but in practice, unless there is a well-understood benefit, few users invest much effort in setting preferences.
- Store user preferences on the server: (If cookies are used then every user of that terminal will see the personal content of the first user and the preferences are lost when the cookies are removed).
- Invite the user to customise, and outline the advantages.
- Keep any customisation feature quick and easy to set up.

- Automatic personalisation should be avoided unless it can consistently and accurately match the users needs and expectations.
- Users should be informed of any changes (made by automatic personalisation) and have the opportunity to override them.

Another recent JISC funded study by Asensio [LR22] investigated the user requirements for a moving pictures and sound portal. The study identified a requirement for users to be able download and edit resources available from the portal. The Asensio study calls this editing (which happens not on the service but on the user's machine after download) "personalisation" – clearly very different from the definitions used in this report. The Asensio study does not identify a requirement for personalisation of the portal presentation component.

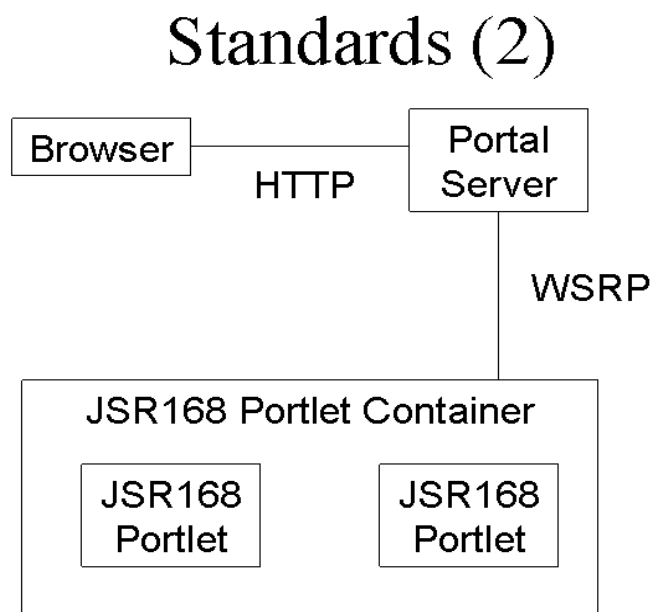
As can be seen from the discussion of the role of personalisation within the JISC Information Environment above, Authentication and Authorisation services potentially have a major role to play in providing access to information already held about users. This is discussed in section 5.5.5 of this report.

### 5.1.3 Standards

Although there are no recognised or de facto standards which related solely to personalisation, it is clear from the discussion above that personalisation services will need to interact with other services in the distributed environment. The JISC IE lists a number of key standards <<http://www.ukoln.ac.uk/distributed-systems/jisc-ie/arch/standards/>> which enable components of the JISC IE to interact. In the context of personalisation services, the Web Services architecture and its related standards (XML, UDDI, WSDL) are particularly important [LR23]. A good introduction to Web services is provided in Gardner's Ariadne article [LR24].

Adoption of the Web Services architecture enables systems designers and implementers to integrate content from a variety of distributed sources relatively easily. The availability of accessible and relevant content is necessary if presentation services such as portals are to be regarded as useful by end users. In this context, the larger the pool of available content, the more likely it is that users will value a personalised view on the landscape of resources. A recent extension to the Web services framework, which promotes access to remote content, is the WSRP specification [LR25]. WSRP sets out the standards for integrating remote content into a portlet using the Web services architecture. In portals based on Java (most modern portals), the most important recent standardisation effort has come from the Java Community Process where JSR-168 [LR26] has defined a set of Java APIs which define the way portlets are integrated into portals.

The following diagram, produced by the Subject Portals Project [LR27] describes the relationship between WSRP and JSR-168:



Although portal developers or purchasers should consider support for both WSRP and JSR-168 as being important in enhancing interoperability, it is JSR-168 which is directly relevant to the mechanics of implementing personalisation in a portal made up of multiple portlets.

Within the broader context of promoting interoperability, a range of standards developed by the IMS Global Learning Consortium are important. CETIS [LR28] provide an excellent service of tracking the relevance of these to the FHE community. In the specific context of user modelling or profiling, the IMS Learner Information Profile (LIP), which forms the basis of the forthcoming British Standard BS8788 [LR29], is likely to become widely adopted within FHE for exchanging information about students between systems. Pressure on institutions to adopt systems which allow exchange of learner information is increasing from a number of sources including QAA requirements for an HE Progress file, the European Diploma Supplement and growing interest in both the UK and USA in Personal Development Planning and ePortfolios. This area is reviewed fully by the JISC-funded ePortfolio project [LR30]. Again, whilst not relating directly to personalisation technologies, the ability to access data about individuals held in third party systems will help clear away some of the major inhibitors to implementations of personalisation.

Looking further afield than the UK academic community, growing concerns about privacy issues as outlined above have led to the formation of the Liberty Alliance Project [LR31]. The Alliance is a membership organisation with many high profile commercial and governmental members. Their goal is to develop open specifications to promote the use of 'federated identity' to both simplify the sharing of appropriate user data between trusted organisations and remove the need for centralised storage of composite user details, thus addressing some privacy concerns.

When it comes to describing resources in a consistent manner (to enable them to be mapped against learner profiles), developments based on the RSLP Collection Description Schema [LR32] appear currently to be most promising, especially in the digital library context. Common approaches to representing and exchanging information about resources will act as an enabler for personalised systems in the same way as common approaches to sharing information about individuals.

## 5.2 Product Summaries

The following section provides a brief overview of some of the key products and toolkits available for use in the UK academic community at the moment and summarises what personalisation features are offered.

### 5.2.1 Key commercial products in use in FHE

#### 5.2.1.1 Portals

Although products such as SharePoint [LR33], based on the Microsoft .NET framework, have a widespread following outside FHE, there is not enough evidence of use within FHE for them to be reviewed in detail here. The remaining commercial products in widespread use are generally either Java based or offer J2EE interfaces for integration purposes. SAP Enterprise Portal (part of the mySAP suite) [LR34] based solutions are in widespread commercial use, but do not appear to have gained a major foothold in FHE, presumably on cost grounds.

The most widely used commercial products, based on anecdotal evidence, appear to be Oracle Portal [LR35], Plumtree [LR36] and Sun Portal Server [LR37]. SCT Luminis [LR38] is not discussed in detail here as it is based on the uPortal framework which is covered in section 5.2.2.1.1 below.

##### 5.2.1.1.1 Oracle Portal

Oracle's portal offering is designed to be easy to deploy with 'wizards' guiding administrative users through most key tasks. Earlier versions of Oracle's portal offered a proprietary SOAP interface to bind in remote content, This is being replaced with WSRP compliance. Similarly, Oracle was actively involved in the development of JSR-168 and offer the opportunity to build compliant portlets via their Portal Development Kit (PDK). They also provide access to large number of pre-built portlets via their older proprietary API. Although quite 'open' and standards-based in many respects, one interface that isn't open is that to the underlying database, with an Oracle 9i license being required.

Personalisation features are quite advanced with users being assigned the following permissions on a page-by-page basis:

- . Customization (Full): add portlets, delete, move, hide, or show any portlet on page
- . Customization (Add-Only): add portlets, remove, hide, or show those portlets he or she has added
- . Customization (Hide-Show): hide or show any portlet on page
- . Customization (Style): apply different style to page, customize page color & fonts
- . View Only: view content of page, can't add, remove, show, or hide content

Within portlets, users can also customise parameters such as search order, etc.

Adaptive Personalisation is supported through the authentication system being integrated into group level privileges, automatically assigning content, home pages, etc. to group members (APOD). Finally, Oracle has, as an optional extra, a Personalisation module which can track user activity and act as a recommender system (APUA).

#### 5.2.1.1.2 Plumtree Portal

Plumtree's portal is widely used in commercial contexts. Although not currently used extensively in UK FHE, Plumtree do target the education sector and have a number of US Universities amongst their customers. The slogan is 'radical openness'. By this it means the ability to integrate with both J2EE and .NET frameworks. Its portal is part of a suite of products aimed squarely at supporting the enterprise level Web presence and it is tightly integrated with elements such as the collaboration server and knowledge directory. Like Oracle, Plumtree's support for portlets and its integration of third party content pre-dates the WSRP and JSR-168 standards but now provides fully tested compliance.

Plumtree offer users the ability to customise the content and presentation of information in a range of ways. The collaboration server allows for a range of shared workspaces and collaborative environments to be deployed. The portal also builds a user profile and can distribute user details via a Web services interface. There is also the ability to monitor user activity, although no built in support is apparent for adaptive personalisation.

#### 5.2.1.1.3 Sun Java Portal

Sun's big selling point for their portal offering is 'identity management'. This involves integration with the bundled Sun identity server to enable single sign on across a range of applications. Otherwise, Sun's offering is similar in features to Plumtree and Oracle, including support for WSDL and JSR-168. Interestingly, Sun is the only vendor to mention Liberty Alliance in its list of supported industry standards.

Adaptive Personalization (APOD and APUA) is achieved via the add-on "Personalized Knowledge Pack" which offers:

- . rules-based auto-classification based on analysis of the full text of documents
- . user driven personal interest profiles
- . user rating of documents for use in collaborative filtering
- . enhanced collaboration features.

### 5.2.1.2 Digital Library

The majority of standard library automation systems occupying the 'presentation/ customisable' quadrant of Dempsey's grid (see 5.1.1.3) offer limited customisation features, although, increasingly, features such as saved searches and alerting mechanisms based on simple interest profiles are also available. Metasearch tools, which allow multiple transparent searching of multiple data sources, allow further customisation options (mediation/ customisable), such as the ability to select the data sources to be searched, sometimes offering the ability to save one or more 'profiles' consisting of groups of search targets (rather than user interest profiles *per se*). Amongst the most popular of these in the UK academic community are MetaLib from Ex-Libris [LR39] ENCompass from Endeavor [LR40], Horizon Information Portal from Dynix [LR41] and Prism from Talis [LR42]. FDI's ZPortal [LR43], although developed partly from a JISC-funded project, has no users in the UK academic community, but it is used in the North Bristol NHS Trust (UK) and as the basis of the ARL Scholars' Portal project in the USA [LR44].

Searching the Websites of these vendors reveals that only Dynix have published detailed plans for adaptive personalisation features, via a 'personalisation wizard'. Although they stress that all features will be 'opt-in' (i.e. explicit), Dynix plan to integrate 'continuous preference learning' through tracking user activity. There is no indication, however, when this vision will be incorporated into products.

### 5.2.1.3 eLearning

The market leaders in the FHE virtual learning environment market are Blackboard [LR45], WebCT [LR46], Granada LearnWise [LR47], and Technical Virtual Campus [LR48]. Both Blackboard and WebCT ensure that their latest generation products can interface with campus portals and authentication/authorisation services. Technical's eLearning Portal Server integrates with Virtual Campus and provides pass-through log-in to it. Blackboard, offers its own 'Community Portal' product which, similarly, has role-based personalisation options. All four offer built-in features such as collaboration environments, and accessibility options.

## 5.2.2 Open Source products

### 5.2.2.1 Portals

#### 5.2.2.1.1 uPortal

uPortal [LR49] is developed by the Java Architectures Special Interest Group (JA-SIG), an independent membership organisation based in the USA. uPortal development was funded in part by a grant from the Mellon foundation.

uPortal's strength, compared with other portal offerings, is that it was developed by the FHE sector for the FHE sector. It is available under a "Free / Free" open source license. It is described as a portal 'framework' which "takes care of the common functionality that every portal needs, so that you can implement the parts that are important and specific to your campus".

As can be deduced from the developers' title, uPortal is written in Java, using XML and XSLT in the common, state of the art, manner. Although it is shipped with Apache Tomcat, uPortal has also been deployed successfully using other servlet containers including Resin & BEA WebLogic. It relies on a relational database (such as MySQL) to store user and resource details. WSRP compliance was built in to r2.2 in April 2004 with JSR 186 support in r2.3, available from June 2004. A major upgrade, r3.0, is in development with no current release date.

One of the refreshing features of UPortal is the honesty of the developers about its limitations. The FAQ warns of problems, for example, with use of LDAP for authentication.

The personalisation features of uPortal include the ability to define layouts based on changing the layout of 'Framework elements' (tabs, columns, header icons) or their content (the 'channel' or 'portlet'). Administrators may define a default layout and content for individuals or groups (APOD). They may also allow individuals to customise some or all of these settings. As outlined above, all user preferences are stored in the underlying database. A number of commercial organisations offer installation, integration and support services around uPortal. Of these, the most widely known in the UK is SCT Luminis [op cit] which is used by the University of Nottingham and the University of Birmingham.

#### 5.2.2.1.2 Jetspeed

Jetspeed [LR50] is an enterprise information portal server developed as a project of the Apache foundation. Like other Apache projects it is based on Java and XML technologies. It has been developed in conjunction with other Apache software, notably Tomcat, but should be able to be deployed using other servlet containers. Jetspeed is available under the Apache open source license which allows the product to be freely distributed for both commercial and non-commercial applications. Jetspeed provides a range of standard portlets for content such as RSS, HTML, Java Applets, etc. However, there currently appear to be no plans for JSR-168 or WSRP support. Like uPortal and Jahia, Jetspeed allows users to choose which portlets are displayed and customise the screen layout. Customisation is also driven initially by the authentication service.

#### 5.2.2.1.3 Jahia

Jahia [LR51] is a "collaborative source" portal server with integrated content management features written in Java. It promises full JSR-168 support for integration of portlets and a 'layout manager' which allows users to customise their screens (similar to my.yahoo or, indeed, uPortal). Jahia is aimed at commercial customers rather than FHE and the software license is based on a 'contribute or pay' model, although the source code is freely available.

### 5.2.2.2 Digital Library

#### 5.2.2.2.1 My.Library initiatives

There appear to be a wide range initiatives labelled “my.library”. One of the most frequently cited is that developed at North Carolina State University and now maintained by Eric Lease Morgan at University of Notre Dame [LR52]. My.library@ncsu is simply a set of PERL scripts (actually 2 sets – one for the admin interface and one for the end user interface). The system is based on constructing a simple user model using key words. Librarians manually catalogue a wide range of resources (Web pages, databases, Internet journals, etc.) using these keywords. The user is thus presented with a personalised list of resources which match his or her profile as a starting point (APOD). From there, the user can customise the system by adding or removing a subset of the resources (those highlighted with an asterisk) proposed by the librarians or administrative users. There is also the opportunity to customise some of the cosmetic aspects of presentation. My.library is available under the GNU Public License (GPL).

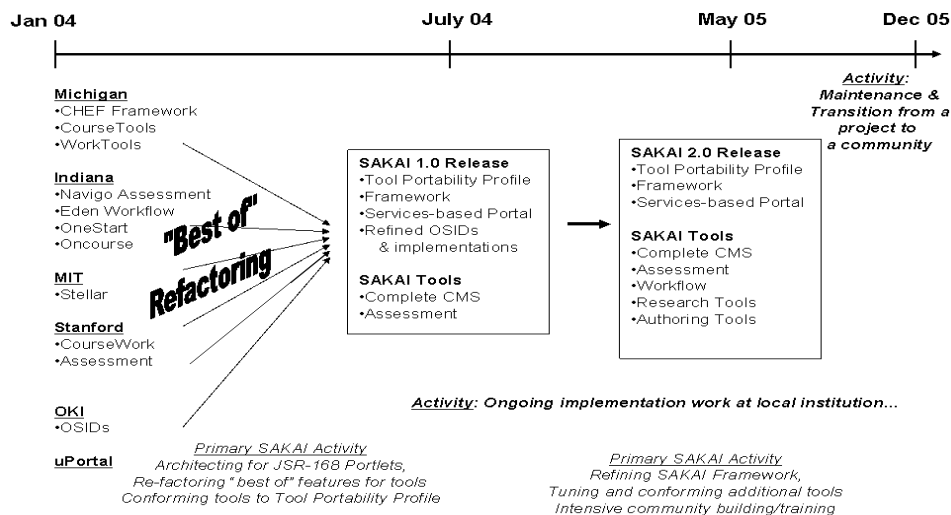
### 5.2.2.3 eLearning

#### 5.2.2.3.1 Bodington

Bodington [LR53] is an open source VLE developed by University of Leeds. It has been used collaboratively with other organisations, for example as part of the PORTOLE project. Publicly available documentation is sketchy at the moment and there is no reference to the availability of personalisation features, although accessibility is a major design goal.

#### 5.2.2.3.2 Sakai

Sakai [LR54] is a collaborative development project, supported by the Mellon foundation, which is producing an open source Collaboration and Learning Environment in Java. Project partners and timescales are shown below:



#### Sakai Project Timeline

Although Sakai is not directly addressing personalisation as part of its primary activity for either the 1.0 or 2.0 release, it can be seen that it is closely related to uPortal and will therefore be able to utilise the personalisation features of uPortal. The architecture is based on JSR-168. In theory this means that the Sakai tools could be delivered via any compliant portal. However, initial releases of Sakai will rely on embedded uPortal configuration. The project's current advice is that “it is best to think of Sakai running in the uPortal framework for the next two years unless someone wants to mount a significant development effort”.



#### 5.2.2.3.3 COSE

The development of COSE [LR55] was initially funded by the JISC and the team have received subsequent JISC funding to investigate and enhance interoperability. Work on interoperability has focused on implementing interfaces which support a variety of IMS specifications including Content Packaging and Metadata (now IEEE LOM) as well as ADI SCORM. The next release, v2.1, (due 'mid 2004') promises full conformance with v1.01 of the IMS Enterprise specification. This version also promises to be available as open source (the current version is available as a binary distribution with a free licence and optional, priced, support package).

COSE sets out to be learner centred and incorporates a range of groupware features including chat rooms, sharing of content and sharing of annotations. Tutors are able to create and manage hierarchical 'groups' which can be set up for a department, course, year group, topic or individual learning opportunity. Tutors can assign tasks to groups and publish 'pagesets' of resources for use by groups. Users can also manage their own peer groups, maintain their own unpublished pagesets and share these with others. In personalisation terms, the user experience is a combination of Customisation and APOD. COSE is used and actively developed by Staffordshire University. The website provides no information about other institutions using the software.

#### 5.2.2.3.4 Colloquia

Colloquia [LR56] was developed using JISC funding as another 'home grown' VLE concentrating on support for group working and group learning. It does not currently appear to be actively under development as a stand alone system, although it has been used as part of the RELOAD project.

### 5.2.3 Toolkits, Middleware etc

There are a number of open source toolkits available which can assist in the implementation of adaptive personalisation. The majority of these focus on Collaborative Filtering. A number of toolkits have been developed in the context of specific use scenarios – e.g. ratings of books or movies. Whilst these may have generic components which may be applicable elsewhere, they are not reviewed here.

A second group of tools appear to have been developed principally to as an aid to academic research into the area rather than as 'products' in their own right. These include Foxtrot from Southampton University [LR57] and Altered Vista from Utah State University [LR58]. The latter appears to have some potential for wider use and is of particular interest because it has been used in the context of aiding the search for learning objects. The researchers conclude that US academic users tend provide ratings with a marked 'ceiling effect' and with a large degree of consensus and that this, although producing accurate predictions, means that personalised recommendations do not differ significantly from recommendations based on averages taken across the entire community.

Other toolkits which appear to have potential for applicability include COFI [LR59] and the similarly named CoFE [LR60] (previously known as CFEngine). COFI, although still officially a beta release, has been used in at least one real world application. It provides "a foundation of already tested [collaborative filtering] algorithms and documented that can be used in a wide range of contexts from research to applications" and is available under the GPL. CoFE, on the other hand, is intended to be a complete collaborative filtering solution, rather than an extensible set of algorithms. V0.3 of CoFE was released in March 2004, indicating that this is not yet a mature product, although development at Oregon State University appears to be quite active. The open source license is similar to the BSD license.

The final category of personalisation tools are those which are designed as modules for use with particular Content Management Systems. An example of such a module, based on APUA techniques, can be found on the Drupal [LR61] website. Although there is no reference to a similar module currently in existence for use with ZOPE, this might be seen as a likely area for development.

## 6 Emergent themes and issues

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All the methods we have used for collecting views and information have been productive – many issues have been raised, often the same issues in different fora. We felt it would be artificial to separate the results of the different methods, so we have brought together the emerging issues in one section.

### 6.1 The role of portals

Some respondents refer to ‘thin’ portals. By this they mean portals whose aim is to deal with authentication issues as far as possible and to bring together diverse types of information from a variety of sources (e.g. publishers, student record systems, library catalogue, Internet resource catalogues, search engines etc) but not to control the subsequent interface to, or look and feel of, that information as the user follows the links. The converse is the ‘fat’ portal which brings all this information together but also imposes a uniform identity and interface upon it so that it appears to be consistent and within one local or institutional service.

There is disagreement on which of these paths should be followed. At the workshop in Edinburgh we learned from Katie Anstock from Talis that many of Talis’ customers (mainly teaching and learning institutions and public libraries) are requiring a fat portal approach. However the institutions to whom we spoke which are currently implementing portal technology seem to have decided on a thin portal. From the University of Edinburgh, Anne Marie Scott’s opinion was that fat portals will not currently work well due to lack of screen space and waste of well-designed information.

*people have already put a lot of effort into custom building those interfaces which you will be throwing away* Anne Marie Scott

Much doubt was expressed about whether a fat portal is achievable with current technologies and whether it could give students what they want. In technological terms, the impact of standards such as WSRP and JSR-168 will be to make it easier both for remote content providers to make their content available in a form that can be rendered by a variety of portals and to make it easier to integrate a number of these ‘portlets’ into a portal framework. As ready made, off the shelf and standards compliant portlets become readily available, the move towards ‘fat’ portals will gain momentum. However, this does not address the ‘screen real estate’ concerns expressed above.

Whether commercial suppliers of VLEs or library systems will build full portlet functionality into their systems remains to be seen. At the moment it seems that the most likely scenario is to apply the user login to draw personalised information, such as learning level or staff/student status, from elsewhere in the institution and then to “drill down” to appropriate pages within environments such as VLEs, library systems and calendar applications and to leave users in those environments from that point on. In reality, it is perhaps not useful to view the issue as either thin or fat. There will be certain classes of application which are intrinsically suited to being rendered as portlets and others that will require their own space. Rather than seeing the portal as the sole application controlling access to resources, the metaphor of portal as ‘dashboard’, providing a handy reference point to commonly used information, is probably more useful.

Looking into the future, Paul Browning mentioned that Chuck Severance from the Sakai project talks about rich clients replacing browsers. This is a highly disputed area, others point out that there have always been vested interests promoting proprietary alternatives to browsers, and moreover that the presentation layer must work with a variety of clients. Information will have to be served to devices or interfaces designed for disabled users, mobile phones and other small devices. Personal profiles will need to be adaptable to allow for multiple delivery mechanisms depending on receiving device.

### 6.2 What do users want? What do they need?

Much of our discussions and much of the feedback we received focussed on user wants and needs. Nearly all the data on this is anecdotal and there is a need for some systematic user requirement gathering (and collation of current and future user requirement gathering processes within UK academia).

*... in my opinion, users do want and/or need personalization. For example, I am going through a Website redesign process right now at the University. Through ongoing focus group interviews, surveys, usability studies the idea of customization/personalization comes up again and again. While not a dominant theme*



*in the discussions, it is given more than a passing nod. Furthermore, it is impossible to be all things to all people. The usual response to such a situation is to provide a lowest common denominator approach to products and services. Customization and personalization provide means to go beyond the lowest common denominator approach. Eric Lease Morgan*

It was pointed out to us that end users in the University of Hull survey did not mention personalisation but they asked for things which could only be delivered using personalisation e.g. "I want my course notes on line".

Do users want, need or use personalisation? From IT support at a large US institution comes an answer:

*I think they do [want personalisation], but I don't know if they know they do. We get many contradictory requests from end users about how they would like our on-line services to work. By allowing end users to personalize their own experience with a portal we could permit more variety and flexibility for the end users. Questionnaire respondent*

... and from a senior researcher in Canada:

*I am not so sure that they want personalization. ... That said, I would suspect that people need personalization and that they would want it if it were taken away from them. Email is an example of personalization (imagine having to search Google to see whether anyone has a message for you), and if email were taken away, people would complain. So I think that, even if there is no stated desire for it, people want and need it, but this depends a lot on how it is deployed. Stephen Downes*

There seems to be much anecdotal evidence that, when given the opportunity, most users will not bother to create a profile or to customise their experience substantially. However it seems that what you might call "second tier customisation" is more popular. In other words, if a form of groupisation or adaptive personalisation based on data held elsewhere (APOD) is used to create a profile and thus a ready-to-use customised experience, then users are more prepared to go in to that profile and complete or alter the customisation themselves.

*where you have information already then you can offer a personalised system which users will be keener to adapt (than to create one from scratch). Paul Miller*

*[academic users] don't want to \*have to\* personalise all the Web-based services they access. It should always be discretionary. But they also will respond positively to applications/tools/etc that make it very easy while guaranteeing privacy. Questionnaire recipient*

As can be seen from the product review section of the literature review, the ability to define an initial starting point for users in terms of both format and content, then allow users to customise from that point on, is a common feature of both commercial and open source portals. Another important aspect of this, at least as far as institutions are concerned, is the ability to limit the extent to which users can make changes. In this way, it should be possible to ensure that all users see the 'important announcement' portlet which lets staff and student know about campus closures<sup>10</sup>, etc.

Anne Ramsden from The Open University gave a presentation at our London workshop focussing on her work to include personalisation in the OU library portal. Building on work done by Eric Lease Morgan for MyLibrary at Notre Dame (see 4B2.3.1), the OU service offers subject alerts from diverse databases and TOC (table of contents) alerts from e.g. Ingenta, MyOpac, and MyBookbag. Her experience is that users do not use the customisation features to create profiles BUT where OU pre-populates with data then more users, particularly "power users", modify their profile. The pilot has been a success and even before its scheduled finish date the OU are now rolling it out to their student body; Anne feels the key feature is allowing users to gather important "stuff" in one place. An important factor which will ring bells in many finance departments is that it increases the use of resources to which the OU has already subscribed (she found substantial evidence that students in ignorance are paying for resources that institutions have already paid for just because of the multiplicity of entry points and students ignoring local information in favour of crude searching).

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<sup>10</sup> At the University of Edinburgh, the highest ever voter turnout at student elections has been explained by some as a result of an advert on the portal (which was seen by all students accessing the online learning environment).

Jillian Griffiths has also studied the use of resources by students and found that they are entirely dependent on the input (enthusiasm and skills) of the tutor. Students tend to give the same weight to any resource (much agreement around the table) so she feels there is a need for level information and a great need for information seeking skills to be taught to students and that services such as the RDN's VTS (Virtual Training Suites) which do exactly this are not used enough. She and others are worried that spoon feeding students with selected resources will prove further disincentive for them to learn information seeking skills, and that solving this problem requires training not technical development. As Clifford Lynch points out:

*At present many of our information retrieval systems conflate relevance with quality (as do many users), and socially-based systems are particularly prone to this. Some careful work is needed to disentangle these, and this may have important implications for personalization and recommender systems.* Lynch op cit

Several respondents cautioned against reliance on systems which restrict a user's view to those resources which the system or its editors consider to be relevant.

*How do I know that someone else's judgements will be any good? I want to know about things which are not relevant to my area. I have good information seeking skills. So leave me to it.* Interview participant.

Others were keen to point out that users' experience with commercial services like (Amazon, Google, Expedia, eBay, Friends Reunited etc) sets their expectations for services offered by the UK academic community, expectations which will be hard to meet. One went so far as to suggest that if institutions wanted to provide personalised interfaces to appeal to users then users should be able to top up their mobile phones and buy concert tickets and travel tickets from the institutional portal. However we believe that there is room for portals and personalised services which aim to do specialised things well. The academic community has particular needs that can be met by excellent user-involved services, in our opinion it would be a mistake to believe that it is desirable or possible to create a user interface to everything, a one-stop portal.

*When building Websites, practice user-centered design. Focus on the tasks users need/want to accomplish, and do not structure it as if it were an organizational chart. Employ principles of usability throughout the entire Website creation and maintenance process. Use customization/personalization to fill in the gaps of a Website's generic interface. Use it to supplement the user experience, especially the experience of frequent users.* Eric Lease Morgan

*I caution the community against personalizing everything -- it's a waste of time and resources. Focus on user benefits first and foremost - will the personalized function save the user time/money/frustration? Will the user actually take advantage of the personalized function? Will the user have a better experience with the service because it was personalized? If the answer is emphatically yes, you should personalize your service.* Dana Dietz

*Too much user control may create a new overhead for support staff, if, for example, a user switched off content which the institution is relying on them to make active use of. Too much flexibility in the user interface may make the interface too difficult for some users.* Interview participant.

## 6.3 Access and accessibility

### 6.3.1 Access

Two particular issues involving access and accessibility need to be noted here. At our workshop held at an FE institution, an interesting bandwidth issue came up during demonstrations and presentations. One attendee remarked:

*What is the point of all this stuff if the [FE or ACL] infrastructure is so poor that you cannot use it?*

This itself begs the question "How much heavier on bandwidth is a personalised service than an un-personalised one? Do different technical options affect this?" It is certainly a question that designers and implementers should bear in mind. Where broadband is widely available and many students will have experienced it or even have it at home, this deficiency will look stark, a painfully slow connection at their academic institution will damage the credibility of the institution and the services used. Mark Williams noted that at least 60% of FE students do not have a "meaningful" (i.e. usable and used) email address, and that a UK study at an HE institution revealed that 40% of the students had never logged in to their .ac.uk email account

(though clearly many of them were using email through an ISP account). Users must not only have tools fit for purpose, but the knowledge and motivation to use them.

### 6.3.2 Accessibility for all abilities

*Accessibility options are important for user choice - for example, enabling large fonts/ high contrast but also for core materials to be printed – [this is a] popular and much requested option. ... personalisation discussion can also be used to examine bad practice - for example where course navigation is overly controlled by the designer, not allowing learners to skip ahead/around ... The way forward is to link the personalisation discussion back into the concept of learner-centred learning, offering choices to learners, and allowing them to take more responsibility for learning. Doug Gowan*

Giving users the opportunity to customise a service to suit their preferences, for example by switching off graphics, or changing font-sizes or background colours, can improve the value of the service to the user.

*By permitting multiple renderings of the same content, accessibility can be enhanced. This is a key advantage of building personalisation into a service. Perhaps every web site should have a standard service personalisation page.<sup>11</sup> Interview participant.*

Customisation of this kind, along with any done by the user through adjustments to their browser, may result in the user's experience of the service being different to that which the provider expects or intends. For this reason a service should be designed so that it continues to function adequately even if a user customizes it in fairly extreme ways.

A particular issue is to ensure that users of assistive technology are able to understand any use a service makes of adaptive personalisation, and that if customisation is a feature of the service, that the customisation interface is itself usable when rendered using assistive technology. The potential use of techniques such as transcoding to render content for display on a variety of devices is discussed in [5.1.2.1](#).

Personalisation can reveal process problems in administration, and as we saw earlier in the comments on Managed Learning Environments it also demands more from designers, teachers and implementers:

*... these personalized courses utilize a level of interactivity that requires course designers to plan and quality-test their courses to an even greater degree than non-personalized courses before they are released to students. Questionnaire respondent*

## 6.4 Authentication, Authorisation and Accounting (AAA)

### 6.4.1 Software frameworks

It is not appropriate to discuss here the many technical and strategic issues under this heading, but it is important to note that AAA technology is an essential component (or a precondition) for implementing personalisation. In the UK, Athens (run by Eduserv see <http://www.eduserv.org.uk/>) has been a widely used initiative. Athens is a centralised access management system used throughout UK Higher and Further Education for the creation, storage and management of usernames and passwords. An Athens username may be used to access any of the 260 Athens protected resources (although the majority require your institution to have subscribed) – see <http://www.athensams.net/dsp/resources.html> for a full list. Eduserv Athens see themselves as “the guardians of information about individuals in the UK Higher and Educational community” and hold the current JISC contract for authentication and authorisation until 2006. Athens also offers some technology to allow developers to implement elements of single sign-on access to these resources. Many Athens protected resources use the Athens username as a key to personalisation within their own resources. In the NHS - another key Athens client - the Athens username is designed to be transported to other NHS organisations throughout the individual's career in the NHS. This means that 'favourite journals' and search histories might be retained as the individual moves around the NHS - a junior doctor typically works on six month contracts. Athens have recently introduced organisational and user attributes into the Athens system, starting with the attribute role=student. This has raised a number of worries in the Athens community about 'personal' information being divulged to outsiders. The Athens database allows Athens administrators to record

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<sup>11</sup> For an example of this see the “Change Layout” option on The Sheffield College's web site – <http://www.sheffcol.ac.uk/>.

information about their users such as department, number, email address, phone number; however none of this information has been released to outsiders. Athens are currently actively considering options for what they call “ Managing Attribute Release Policies within the Athens Identity Management System”. Lyn Norris from Athens comments:

*The introduction of attributes has brought this concept a little closer; and we certainly believe that an Attribute Release Policy is necessary to allow individuals to control the release of this information.*

For a variety of reasons JISC are now encouraging institutions and developers to look at using Shibboleth as a possible future AAA infrastructure for local and national implementations. More information can be found at:

<http://shibboleth.internet2.edu/docs/internet2-mace-shibboleth-introduction-200404.pdf>

<http://www.jnug.ac.uk/presentations/authentication-and-authorisation-0402.pdf>

[http://www.jisc.ac.uk/uploaded\\_documents/NotesoftheTownMeeting.doc](http://www.jisc.ac.uk/uploaded_documents/NotesoftheTownMeeting.doc)

Comments on how Shibboleth addresses personalization (note spelling) issues can be found in:

<http://shibboleth.internet2.edu/docs/draft-wasley-shibboleth-portals-02.pdf>

#### **6.4.2 Single login to multiple resources**

It is worth noting that there is a long way to go in this area, even to achieve what might be considered a simple step of allowing users to access resources with a single login. Note the comments of a digital library expert from a leading US institution:

*One sign-on and password for all would be ideal ... [the] more current alert services we offer, the more important personalization is ... Personally, I don't think most users know what it is and what is possible ... It would be great if on logon, we can know which department you are from, what subject you are majoring in and your special interests. Then we can offer special services pertaining to that information ... until we have a good authorization and authentication system, it is not worth the effort to implement.*

Another, this time from Australia, in a similar vein:

*I am yet to see any personalisation that was highly compelling. One of the problems is the lack of Single Sign On between applications which would otherwise make it seamless to have personalisation data passed from one application to another (although the need to address privacy and security are big hurdles to this).  
Professor James Dalziel*

It should be noted here that Athens has allowed an effective single sign to multiple services in several situations – the RDN Subject Portal Project (SPP) is mentioned elsewhere as an example.

### **6.5 Profiles and preferences**

In order to achieve personalisation, user profiles and preferences must be stored or collected in some form. This issue came up in virtually all the discussions we had and responses we received. It spawns issues of privacy, access, authentication and others that we deal with below.

Any user will have multiple preferences and/or profiles in multiple areas of their Internet usage – work/home/study/leisure etc. One user may be a hospital employee and a student at another institution and a teacher at an evening class elsewhere – who would they trust to hold their information?<sup>12</sup> More commonly a user may be happy to entrust an academic service with preferences for work-related research and teaching information but not about bank details, leisure pursuits, union activity etc.

Whilst AAA is an essential ingredient for sharing appropriate access to resources, the issue of trust goes much wider.

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<sup>12</sup> It may be that ePortfolios <<http://www.eportfolios.ac.uk/>> could form part of the machinery for transferring profiles to achieve personalisation in different contexts – users could share preferences between ePortfolios and other services in both directions, but there are many claims for the future capabilities of ePortfolios and they may be drowned by the weight of expectations.

*Customization/personalization is a method of building relationships between individual users and institutions providing goods and services, whether they be students and libraries or parents and computer manufacturers. By building trusting relationships everybody benefits. Responsible application of customization and personalization techniques enables the creation of trusting relationships in a networked environment. Doctors help build this trust through doctor/patient relationships. Lawyers facilitate this relationship through lawyer/client privileges. I believe the same thing ought to be fostered between librarians and patrons. In fact, to a great degree it already exists but many patrons do not know it.*  
Eric Lease Morgan

Academic services will need to take a somewhat different attitude towards their users than commercial organisations. It may be necessary to collect and reuse information about users but there should be clear and open acknowledgement of that so that users understand what is going on. An endless small print agreement to which the user is required to respond "OK" on screen before proceeding is not good enough.

*... one should be aware that these kinds of personal information could be valuable in the commercial sector and appropriate means of dealing with that have to be explicit ... be frank and honest and tell them exactly what you are doing. Some users like to have "the system" collect information and adopt automatically others like to have full control over what the systems knows about you. Provide options. Be very explicit about user security issues.* Anders Ardo

Users should also be encouraged to recognise the issues. While allowing the choice not to be "personalised" the interface must clearly explain the advantages that collecting information may confer upon the end user experience.

*The issue in the United States is one of privacy. We have a long history of protecting a user's privacy about both their personal data and about what services or resources they use in the library. To achieve personalization, users will lose that privacy. I don't know if they are aware of that, or how they would react if they did know. But if we start tracking users' behaviors as they use our systems, or even start storing information that they provide us about their use of the library, there is an inherent risk of that data being accessed by others.* Questionnaire respondent

The recent growth of systems based on the concept of 'federated identity' (see, for example, the description of the Liberty Alliance in section 5.1.3) raises several issues in this area to which we do not have answers but which are important and merit investigation:

1. Privacy – what is legally allowed? What legal entity has rights to information about your use of services? Does the data protection legislation specify detailed rights and obligation in this area?
2. Is your sign up agreement to Amazon or Microsoft (how many of us read them?) more sweeping than anything you sign up with your institution?
3. Who would you trust to hold your information? Would you want it held in one place with permissions for release of different parts of it to different people? Or would you prefer different institutions to hold different parts of it (with the inefficiencies and uncertainties that may result)? Is there a possible role for institutions which we already trust with personal or financial data to step into this arena?
4. With particular reference to the issue of trust, how much can be accomplished by consortia or organisations which are not legal entities (JISC, RDN etc)?
5. How much of your profile or preferences is transferable? Is it the case that most of your preferences will be service-specific and only a small core subset will need to be shared between organisations and services?
6. Is there a role for a small number of independently verified profile attributes which are freely available but which the user cannot alter (though they can be revealed or hidden by the user)? Level of academic accomplishment might be one.
7. Could a user preference service be distributed across institutions, in the same way that an LDAP directory service works?
8. Might users want a bank of profiles so that they can choose which profile to import into (say) an institutional portal or a national portal?

9. How should information about users be represented in order to facilitate exchange between applications<sup>13</sup>?
10. How would profiles be updated? Would they suffer from the same fate as “under construction” Web sites, abandoned for years on end?
11. How would the lack of common terminology and common understanding of vocabularies affect the portability of profiles?

## 6.6 Issues outside the scope of the personalisation study

Two recommendations arose during the study which are outside the scope of our remit but worth identifying nevertheless:

1. We are aware that tentative approaches have been made to work with Google at a national and European level in the past with some very limited success, but we believe it is important to work hard to make sure that the leading service in this area is working with some of the best creative minds in the UK academic community to pilot innovative and worthwhile services for the academic community. It was suggested that JISC ensure an approach is made from a sufficiently senior level in government to suggest and effect some collaborative work with Google.
2. Different publishers are not consistent in the way they make their resources available, nor are the ways individual publishers make their information available stable over time. JISC have approached a number of journal publishers in an attempt to address this issue, it was suggested that this effort is expanded.

# 7 To personalise? - incentives and impediments

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## 7.1 The business case for personalisation in the UK academic community

In the short term, there are circumstances where there is a clear business case for personalisation:

- Where a service demands knowledge of the circumstances or preferences or level of learning or course attended by the individual user in order to supply the appropriate information (our example earlier of personalisation mimicking the intervention of a friendly librarian for a remote user might be a case in point, correct management of access to a learning environment would be another)
- Where personalisation is a necessary step to streamlining administrative procedures, eliminating queues, and providing timely, critical information
- Where personalisation can replace unnecessary duplication and reveal flaws and anomalies in underlying processes
- Where an institution holds sufficiently accurate data about its users to be able to use adaptive personalisation reliably and explicitly.

In the medium term personalisation may bring a transformation of the landscape as Lynch suggests:

*Imagine that users could maintain a series of local (personal) databases that defined their trust systems (we have the very primitive beginnings of this in the identity trust codified in systems like PGP or certificate collections in Web browsers); their reputation and rating systems; their preferences of various kinds; interest profiles; and their opinions about objects of various kinds (Web sites, books, sound recordings, films, people, etc). Imagine that there were standards for transferring this kind of information to systems that one wanted to interact with, and also standards for updating the locally held, personal databases to reflect actions taken in remote systems (such as purchasing a book, or visiting a Web site); and, of course, tools to edit the personal databases and to establish rules about their update and dissemination. This*

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<sup>13</sup> IMS LIP <http://www.imsglobal.org/profiles/index.cfm> and EduPerson <http://www.educause.edu/eduperson/> were both mentioned

would potentially permit instant personalization of any system that one wanted to interact with; it would allow users to visit new sites and immediately obtain potentially useful recommendations from them... Lynch op.cit.

However, this is a large task and one that should be taken on internationally - Lynch goes on to note that:

*Moving from this vision to implementation is a very complex research problem, with lots of difficult details, but one that I think merits investigation. I would just note in passing that a good deal of infrastructure and numerous standards are needed to make this work*

For the UK academic community some well defined elements of this problem could very well be investigated, but attempts to provide a total solution should be avoided until many more of those elements are in place and internationally agreed.

Our respondents noted that while, within an institution, it should be possible to measure the benefits of personalisation in clearly defined circumstances, it may be very much harder to do that in the case of national or “free” information services such as the RDN.

*How do you measure it? – it all looks like cost, without a proven return or even knowing how to prove it. We don't have a record of the users' experience and we have no accounts of any benefits of personalisation. Workshop participant*

Several respondents thought that the institutions should be the focus of personalisation with organisations such as the RDN supplying re-usable resources rather than promoting multiple competing individualised interfaces. Others were adamant that end users preferred subject focussed services such as the RDN Hubs and that the push toward institutional portals was institution-led and not supported by end users. It seems inevitable and desirable that there will be multiple interfaces to high quality information and that there will be some degree of competition between them. Where competition within the JISC community leads to restrictive practices, impedes integration and hinders users, it should be regulated (see 7.2.1 below).

## 7.2 Implementation issues and impediments

Eric Lease Morgan notes that implementers often confuse indexers/search engines with relational database applications. It is necessary to appreciate where these technologies are complementary and when to use one over the other. He also identifies use of proprietary “features” as an impediment and exhorts implementers to try to adhere to open standards

*The underlying use of XML is an excellent example. By employing open standards implementers can be more flexible and adaptable to change. Proprietary features are short-term solutions locking you into specific vendors. In the long run such things are limiting not empowering.*

Adaptive personalisation requires the user's actions to be recorded and stored and, in the case of APOD, to be associated with institutional records. Morgan notes that it is important to be open and to ask permission for this recording from the users.

*Implementers should be sure to let people know that this watching/recording is necessary for personalization. "If you tell me a bit about yourself, then I may be able to help you better, but this information will be recorded as opposed to simply being in someone's head." Librarians take this sort of thing very seriously ... and this is sometimes an impediment to providing personalization services in libraries.*

Dalziel also points out that it is not only the cost and difficulty of learners taking profiles (see 6.5) with them on their journeys through the Web which is an impediment to personalisation within education. Probably even greater is the cost of assembling the metadata for each resource necessary to enable meaningful personalisation.

It was noted that using Amazon or eBay techniques in academia would need a substantial investment and a lot of users. Past experience suggests that motivating users to participate might be problematic. It appears to be much harder to persuade people to review learning materials than books and music. EDINA reported having great difficulty getting reviews of educational programmes when they tried modelling the process on the IMDb (The Internet Movie Database) - “people will review movies but not educational resources”. For their work with SearchLT Engineering, EEVL found that they had to pay people to review learning resources.

Integration between an institutional portal and a third party learning environment is also a challenge, at two levels. Firstly, it may not even be possible to “skin” the learning environment in the colours of the institution. Secondly, a third party’s learning environment will not have the same user interface as the institution’s web site, so that even if users can have personalised access to “their” area of the learning environment, they will inevitably have to contend with a different user interface. (See 6.1, 5.2.1.3 and 4.1.5 for more on learning environments).

### 7.2.1 Efficient use and re-use of JISC-funded resources in personalised services

In the context of our discussions, the position of JISC services, and the RDN in particular, was regularly raised by participants. The SPP (Subject Portals Project), demonstrated in Bristol and discussed in Edinburgh and London, was cited as an excellent step forward. The remit for the Subject Portal Demonstrator was to produce a tool for RDN subject gateways to offer a customisable portal service to users. An example of this customisation is the cross-searching feature which can be customised by the portal administrator; the look and feel of the interface and the information sources and other searching options can all be customised by the users. If users login using their Athens password they can see resources which would otherwise not be available to them, showing a single authentication in action across a variety of services.

The Hubs and subject gateways have subject based data which they can match against individually stated preferences. SOSIG, for example, pushes information weekly about new resources to 4,000 people via email, based on user profiles. It also uses 8,000 profiles for “matching” people with people (Likeminds), and people with conferences, workshops etc (Grapevine). Data protection issues mean this knowledge is not shared beyond SOSIG. The broader issue of who owns the service and the personal data associated with it is unclear. The issue of entities without legal status is referred to elsewhere. Currently different hubs are providing similar services including the same news feeds. At the minimum one would want to share anonymised data about users over the whole of the RDN.

*As an academic member of staff, localisation for me means picking resources from an already classified list (e.g. EEVL) NOT classifying and describing them myself. Part of institutional portals or other portal services is relying on tagged information resource descriptions etc. There will be a need for this activity which happens at SPP and Subject Hubs, even if it is invisible. Workshop participant*

*We want resources to be made available to users from the DNER, with “user meaningful” rather than “dumb” integration: this has always been part of the development plan for our portal. But actually doing this is not straightforward. A further complication is the difference between the data which is under our own control, and the data which is under the control of a third party. Interview participant.*

The data held by elements of the RDN is potentially highly useful but currently used only in a limited way. This applies not only to personal data but to the resource descriptions themselves. They are a valuable collection of data, created by a human-effort-intensive process which is currently impossible to replicate or automate using technology. Yet they are rarely used outside of the UK academic community and even within it their use is very far from widespread. We found that those creating institutional portals and those intermediaries serving end-users recognised the value of JISC collections but were frustrated that more JISC effort was not put into integrating them into a variety of other services. One inhibitor that was mentioned several times, by those outside of the RDN as well as those within it was the way that success is measured for such services – the performance indicators. It seems generally agreed that it is vital for the benefits of national investments to be realised on a local level, yet the success of RDN services seems to be measured on statistics for direct end user usage of their (national) services. This seems to be a problem for JISC services in general with “interface blight” being mentioned by users and intermediaries as a symptom. Every project however small, however infra-structural or background their role, feels that it must have its own interface and must attract the maximum number of users to its site. To create simplicity for users we should be reducing the multiplicity of interfaces/services not encouraging competition between services to drive people to “our” interface. If everyone agrees that the RDN resource descriptions should be used as widely as possible then it is counter productive to only measure Web accesses to individual interfaces - a better measure of success would be if these resources are indeed being used by third parties, institutional portals and other services.

### 7.2.2 Levels and types of learning –suitability of materials

Many people we spoke to were concerned about the persistent problem of levels of knowledge – how do we mark a learner’s levels of knowledge in a particular subject and how do we mark a resource’s suitability for a particular level of learning. Even within institutions this problem seems difficult, and moving between institutions in further education, higher education and adult and community learning, the problem seems



intractable. Several participants thought that personalisation could only have a limited effect until the “level problem” was addressed.

*Users want courses and materials that are relevant to them; solve their problems; are at a level that suits them; use examples they can grasp; are concrete and not overly abstract. Doug Gowan*

*Some e-learning commentators see personalisation as the ultimate goal for e-learning - so every learner can have the perfect individualised pathway through learning resources according to their unique needs. While this is a very attractive idea, it ignores the fact that much of learning is collaborative in nature, and that collaboration presents significant challenges for personalisation as currently conceived. In my view, collaboration learning activity sequences are more valuable than current instances of single learner personalisation, although ideally we need both. The problems of personalisation in a collaborative context are quite complex and not yet well understood. Professor James Dalziel*

### **7.2.3 Vocabularies, Terminologies , Classification and Thesauri**

Controlled shared subject vocabularies, used by all actors/services are seen as a key to enabling customisation. This area appears as “Terminology services” in the JISC IE architecture diagram. However, making this sharing happen in a meaningful way is a substantial problem which has had a lot of international money spent on it with no solution in sight. Work done at HILT <http://hilt.cdlr.strath.ac.uk/> has recently cast light on some of the problems here. Even within individual RDN Hubs, subject vocabularies, classification schemes and thesauri vary between subject areas and users stoutly resist any homogenising. This is not merely stubbornness or “not-invented-here” syndrome. Users and particularly intermediaries such as subject librarians have very good reasons for wanting to use schemes which have been designed for their subject communities and have had a long history of development and adaptation.

For a user profile or model to be matched with appropriate resources requires that these resources are described in some way which allows them to be matched against the profile. Collection Level Descriptions, mentioned in 5.1.3, are one way of achieving this in the bibliographic domain which may be extensible elsewhere, but they generally rely on metadata being created about each class of resource. Manual creation of metadata about all the resources (e.g. Web pages) which could be included in a personal information landscape is clearly an inhibitor to uptake. Auto-classification based on content (see, for example, the description of the Oracle Portal in 5.2.1.1.1) is still in its infancy but, if proven in real world contexts, could help overcome this hurdle but this is unlikely to gain widespread adoption in the very near future.

Adaptive personalisation may require the sharing between services of records of user behaviour. This sharing itself is a highly problematic area – the data sets will be huge, the data protection issues no less significant and the uncertainty over ownership of the data must be resolved. Amazon or Yahoo can achieve results in this area because they control the whole user experience and have a more sweeping user agreement (see above) than academic services.

## 8 Conclusions

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1. User expectations of services available to the academic community will change as they increasingly experience the advantages (and sometimes the disadvantages) of personalisation in commercial services and in the many applications of Internet banking and finance. Personalisation has succeeded in commerce where it fulfils a core function for the business and where the task is relatively simple and well defined. Many businesses attempting a broad and poorly defined application of personalisation have retrenched, abandoned it or even failed altogether. The businesses that succeed with personalisation are, typically, either “pure” web businesses, such as eBay, expedia, Amazon (notwithstanding the latter’s subsequent massive investment in physical order-fulfilment infrastructure), or businesses which already have a very significant investment in ICT like banks and airlines. The UK academic community is not like this, having a far higher proportion of spending on people, a far lower proportion of spending on ICT, and far fewer opportunities to get scale economies. This suggests that the academic community is unlikely in the short term to succeed with broad application of personalisation.
2. Narrow applications of personalisation are far more likely to succeed, particularly where a clear objective has been identified, a business case can be made and control has been or will be established over the relevant, accurate data.
3. Personalisation of institutional information services can offer significant efficiency gains, for staff if they can quickly access institutional information pertinent to their roles, and for students if they can access information for which they would otherwise have to ask in person or in writing.
4. Dalziel points out (quoted above) that generating the individual personal metadata needed to enable learning to be adaptively personalised will be costly and complex; and that manually generating meta data for learning resources (level, content, quality etc) will be prohibitively expensive except perhaps in the very highest volume learning programmes. Automating this metadata generation is possible, but the technology is still at a research stage.
5. Learning environments may use personalisation as one element in an interface presenting a rich mixture of resources to their users. One can imagine something rather like Google’s sponsored links, where the sponsored resources are replaced by resources selected by the institution or by subject experts at the RDN. The search results might also feature the top 5 resources in this area as used by others on your course or at your institution. One might draw the analogy of a flexible restaurant menu, where people on course X always get the lecturer chosen items (the dish of the day) but are also shown the results of their own search or profile (the à la carte items).
6. Educational Web sites and services should ensure that access to resources is available to those who cannot use conventional interfaces. Blind users might require audio interfaces or output in Braille, there are many other examples. It is also likely that users will be accessing academic resources with a wider range of devices including small wireless devices, phones, organisers etc. Access for all should be designed by default for all interfaces, but elements of personalisation may be useful in this context.
7. Very little work has been done on user requirements gathering concerning personalisation in general and this is as true in the UK academic community as in other sectors. Much of the evidence is anecdotal, with features being decided upon by developers and champions not as a result of user testing. If, as Nielsen claims, you only need to test on five users to get useful results, then it seems as if some user testing in this area would be cheap and rewarding.
8. Personalising information supply can amount to spoon feeding. Learners who are spoon fed do not develop the required information skills to be able to find information when they are “away from the portal”, nor do they develop the critical judgement. The RDN VTS is widely praised for guiding users to acquire essential skills without spoon feeding.
9. Systems which allow “human” personalisation, such as a VLE which allows tutors to configure the system to provide learners with a personalised learning experience, are generally popular with motivated staff and students. However such complex design requires more careful and complex testing than do simpler designs. We should not underestimate the extra demands this puts on the staff involved in customisation and design, which may include role playing a whole suite of different types of students.

10. The growing adoption of standards such as WSRP and JSR-168 by suppliers of components such as portal frameworks, will increase the ability to render services as portlets inside a 'fat' portal. However, the fact that the technology enables this does not mean that it will be appropriate for all service types. In particular, it is those services which are designed to have a machine readable interface which will fit best within this framework rather than those where an interface is shoehorned into the framework using techniques such as screen-scraping.
11. Within a portal framework, the benefits of allowing users to customise content and appearance must be weighed against the costs. It makes sense for portal providers to impose some limitations on what can be deleted (or added) and to ensure that certain screen elements are always positioned for maximum visibility. In terms of encouraging users to take advantage of these features, current best practice appears to be to offer an initial degree of APOD (based, for example, on course, subject or even a simple 'staff/ 'student' dichotomy) then allowing users to customise within a restricted set of already targeted resources. There is no compelling evidence to date for the benefits of APUA within the portal contexts, but as open source toolkits offering collaborative filtering and similar functions gain maturity, then the costs of implementing these approaches will fall.
12. The JISC IE provides a logical architecture which should be viewed as a long term goal rather than something which can be achieved immediately. The availability of shared infrastructure services such as user preference services, institutional preference services and service registries would vastly enhance the ability of both JISC services and institutions to offer personalised services. However, such services will take time to become mature and even then it will take time for real world interoperability issues to be resolved. For example, although, in theory, it has been possible to provide an LDAP directory service to provide common user data to a range of institutional services for many years, and many products claim to be 'LDAP-enabled', in reality even such a simple 'shared service' has proved difficult to implement.
13. Within the JISC IE there is a potential need for personalisation to flow backwards into the content sources as well as across different services within the presentation layer. Such sharing may require a trusted intermediary to strip out personal information and possibly restore it as information comes back from the content provider to the presentation service or to the end user.
14. There are many issues raised by personalisation that require international collaboration and standards to resolve. Naming people as creators and/or authors of resources is one such element, possibly creating a unique ID (persistent email address?), which would be useful across a range of services. Unique and persistent resource identifiers are another. User profiles and preferences will also be very relevant here, with candidate standards such as EduPerson and IMS LIP emerging, but far from established. Where standards are yet to be established we do not recommend establishing national services based on ad hoc standards which may be superseded by international work. As Lynch points out (quoted above) there are many and various pieces of work to be done in this area and we believe it would be useful to fund smaller scale pilot projects with discrete, well defined tasks at this stage.
15. All projects and services are likely to create an interface (presentation layer) in order to make themselves comprehensible and visible to funders and intermediaries if not to end users. However this interface creation has a tendency to become an end in itself. It is important to examine the real or potential function of the project or service. With this in mind, we must also always be aware that complex applications will increasingly be made invisible to the end user by processes involving machines talking to machines. All services should bear this in mind and strive to make their resources available as widely as possible – this does not mean abandoning their valuable IPR – it means expanding the potential market place for products which may use that IPR.
16. Personalisation can either be treated as an extra service – an “add-on” - or as a means of bringing about major innovation around which services should be re-engineered. The latter approach is more likely to succeed and result in major improvements in quality of service than the former.

## 9 Recommendations

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1. JISC commission some small pieces of work looking at user requirements for personalisation in well defined parts of services. The work to cover a spread of JISC-funded and institutionally-funded services. The work would not involve developing interfaces or the technical infrastructure to support them (if these do not exist already) but might involve sketching, storyboarding and mock ups.
2. JISC consider funding a small number of projects to explore innovative and tightly defined uses of personalisation approaches, particularly APOD and APUA in the context of JISC services and institutional portals. Such projects could either examine the application of the open source tools identified in 5.2.2.2 and 5.2.3 or address the gaps identified there. All such projects should include a strong evaluation element.
3. JISC fund and evaluate a small number of pilot projects looking at sharing personal profiles. These should fall into two categories:
  - 3.1. Sharing profiles between organisations in the UK academic community. These projects should look at the practicalities of sharing and getting profiles to work. The issues of permission and centralisation or distribution of profile information should be examined.
  - 3.2. Preliminary and investigative projects between diverse organisations, looking at issues of user trust and potential benefits and problems from sharing profiles. Since we are suggesting an examination of which institutions users might trust with which part of their profile, a number of different and novel partners might be considered. We would suggest financial institutions, mobile phone service suppliers (not manufacturers), sporting organisations (both those where users have the role of players and that of spectators), solicitors and trade and student unions.
4. We recommend that all institutions, and particularly those who have a highly devolved information structure, make it a priority to ensure that their data and processes can supply the needs of a personalised service. It is desirable to implement a personalised service which allows teaching staff to access up to date student and course data, students to ensure that their personal data is accurate and administrative staff to access reliable information from an authoritative source. It is also one way to throw a spotlight on insecure, inadequate or duplicated processes.
5. Every effort should be made to capitalise on JISC's substantial investment in services and resources. Users may want to use resources through personalised institutional portals or through subject based services. Promotional activity would be better focussed at service providers, whether institutional or subject-based, encouraging them to use the indisputably valuable resources that comprise for example the RDN rather than attempting to promote an RDN brand to end users. This applies to JISC services in general. While a multiplicity of interfaces is inevitable and desirable for progress, competition for end-user hits which leads to restrictive practices and discourages sharing is undesirable. Assessment measures which encourage such restrictive practices should be removed or reformed.
6. It would be helpful if within JISC there were a common vocabulary for describing personalisation and its results. We recommend that a modified and updated version of the base definitions used in this report (see Appendix 1) be widely used by JISC services, bids, projects etc to define what they are doing and will do by way of personalisation. A short, compulsory survey of all active projects and services would be a good start.
7. For information resources such as RSS newsfeeds to be used interchangeably in a personalised environment such as a portal, there needs to be a consistency of approach to implementation (e.g. the use of the 'title', 'description', 'category' and 'ttl' elements). We recommend that JISC produce guidelines for implementation of each element (in effect an application profile of the RSS specification) for use by all JISC services and that adherence to these guidelines be made a condition of funding. These guidelines should be promulgated widely to enable third party suppliers of RSS feeds to adopt a common approach and to inform consumers of JISC service newsfeeds outside the UK academic community.
8. One or two small projects are commissioned to examine the flow of user information sideways between presentation services within the JISC IE and backwards between presentation services and content suppliers. The issues of stripping out personal information (possibly by a trusted intermediary – see recommendation 3.2 above) and possible restoring of that personal information (as results come back through the presentation service to the end user) should be examined.
9. Some research should be done into the uses of customisation and personalisation to extend access to disabled users. This could be done through a separate project or through integrating this concern into the brief of the other recommended projects above.

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[http://portalstudio.oracle.com/pls/ops/docs/FOLDER/COMMUNITY/OTN\\_CONTENT/MAINPAGE/KEYFEATURES\\_BENEFITS/PORTAL\\_FOV\\_0.HTML](http://portalstudio.oracle.com/pls/ops/docs/FOLDER/COMMUNITY/OTN_CONTENT/MAINPAGE/KEYFEATURES_BENEFITS/PORTAL_FOV_0.HTML)
- [LR36] Plumtree Portal Platform <http://www.plumtree.com/products/platform/>
- [LR37] Sun Java Portal Server [http://www.sun.com/software/products/portal\\_srvr/home\\_portal6.html](http://www.sun.com/software/products/portal_srvr/home_portal6.html)
- [LR38] SCT Luminis Portal [http://www.sct.com/Education/s\\_portal\\_solution.html](http://www.sct.com/Education/s_portal_solution.html)
- [LR39] MetaLib <http://www.exlibrisgroup.com/metalib.htm>
- [LR40] ENCompass <http://encompass.endinfosys.com/>
- [LR41] Horizon Information Portal <http://www.dynix.com/products/hip/>
- [LR42] Talis Prism [http://www.talis.com/products/prism/prism\\_overview.shtml](http://www.talis.com/products/prism/prism_overview.shtml)
- [LR43] ZPortal <http://www.fdusa.com/products/zportal.html>
- [LR44] ARL Scholars Portal <http://www.arl.org/access/scholarsportal/>
- [LR45] Blackboard <http://www.blackboard.com>
- [LR46] WebCT <http://www.webct.com>
- [LR47] Granada LearnWise <http://www.learnwise.com/>
- [LR48] Teknical VirtualCampus <http://www.teknical.co.uk/>
- [LR49] UPortal <http://www.uportal.org/>
- [LR50] Jetspeed <http://portals.apache.org/jetspeed-1/>
- [LR51] Jahia <http://www.jahia.org>
- [LR52] MYlibrary <http://dewey.library.nd.edu/mylibrary/>
- [LR53] Bodington <http://bodington.org/index.html>
- [LR54] Sakai <http://www.sakaiproject.org/>
- [LR55] COSE <http://staffs.ac.uk/COSE/>
- [LR56] Colloquia <http://www.colloquia.net>
- [LR57] Foxtrot <http://www.iam.ecs.soton.ac.uk/>
- [LR58] Altered Vista <http://alteredvista.usu.edu/>
- [LR59] Cofi <http://savannah.nongnu.org/projects/cofi>

[LR60] CoFE <http://eecs.oregonstate.edu/iis/CoFE/index.html>

[LR61] Drupal <http://drupal.org/node/view/920>

## 10.2 Other bibliography

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Common Information Environment -	<a href="http://www.jisc.ac.uk/index.cfm?name=wg_cie_home">http://www.jisc.ac.uk/index.cfm?name=wg_cie_home</a>
eBay	<a href="http://www.ebay.com">http://www.ebay.com</a>
EduPerson	<a href="http://www.educause.edu/eduperson/">http://www.educause.edu/eduperson/</a>
ePortfolios	<a href="http://www.eportfolios.ac.uk/">http://www.eportfolios.ac.uk/</a>
FOAF - The Friend of a Friend (FOAF) project is about creating a Web of machine-readable homepages describing people, the links between them and the things they create and do	<a href="http://www.foaf-project.org/">http://www.foaf-project.org/</a> >
Google	<a href="http://www.google.com">http://www.google.com</a>
IMS LIP	<a href="http://www.imsglobal.org/profiles/index.cfm">http://www.imsglobal.org/profiles/index.cfm</a>
Information Environment Business Logic Study	<a href="http://www.jisc.ac.uk/index.cfm?name=funding_business_logic">http://www.jisc.ac.uk/index.cfm?name=funding_business_logic</a>
Jakob Nielsen's Alertbox for October 4, 1998	<a href="http://www.useit.com/alertbox/981004.html">http://www.useit.com/alertbox/981004.html</a>
KnowLib, Department of Information Technology, Lund University, Sweden	<a href="http://www.it.lth.se/knowlib/demos.htm">http://www.it.lth.se/knowlib/demos.htm</a>
LinkedIn	<a href="http://www.linkedin.com">http://www.linkedin.com</a>
Orkut - is an online community that connects people through a network of trusted friends.	<a href="http://www.orkut.com/">http://www.orkut.com/</a>
OU - The Open University (UK) Voyager Library Catalogue	<a href="http://voyager.open.ac.uk/">http://voyager.open.ac.uk/</a>
Peer-to-Peer, Harnessing the Power of Disruptive Technologies	O'Reilly Edited by Andy Oram , March 2001 0-596-00110-X
SocialNet	<a href="http://www.matchnet.co.uk/">http://www.matchnet.co.uk/</a>
SPP - The Resource Discovery Network Subject Portals Project	<a href="http://www.portal.ac.uk/spp/">http://www.portal.ac.uk/spp/</a>
Talis Information Ltd	<a href="http://www.talis.com/">http://www.talis.com/</a>
The EDINA GetRef service	<a href="http://edina.ac.uk/getref/">http://edina.ac.uk/getref/</a>
The Sakai Project is a US-based \$6.8M community source software development project	<a href="http://www.sakaiproject.org/">http://www.sakaiproject.org/</a>
Transfer of Portfolios Assisting Lifelong Learning	<a href="http://dbweb.liv.ac.uk/cll/page.asp?ID=1561">http://dbweb.liv.ac.uk/cll/page.asp?ID=1561</a>
University of Bristol Pilot Portal Project	<a href="http://www.bristol.ac.uk/portal/">http://www.bristol.ac.uk/portal/</a>
University of Hull Portal Project	<a href="http://www.fair-portal.hull.ac.uk/">http://www.fair-portal.hull.ac.uk/</a>
VTS - The RDN Virtual Training Suite - a set of free online tutorials designed to help students, lecturers and researchers improve their Internet information literacy and IT skills.	<a href="http://www.vts.rdn.ac.uk/">http://www.vts.rdn.ac.uk/</a>
Yahoo	<a href="http://www.yahoo.com">http://www.yahoo.com</a>

# II Appendices

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## II.1 Base Definitions

We supplied this definition list to help discussion during interviews and meetings. The starting point for these definitions was the JISC Information Environment Glossary located at

<http://www.ukoln.ac.uk/distributed-systems/jisc-ie/arch/glossary/>

During the process we found it useful to further distinguish between *Adaptive Personalisation based on User Activity* (APUA) and *Adaptive Personalisation based on Data held elsewhere* (APOD).

**Personalisation** is a function invoked by the Presentation component within a Portal or other Network Service. Personalisation is defined as: 'The ability of a Network Service to be shaped or re-shaped so as to better meet the individual needs or wants of a user' (adapted from O'Looney [JPS-20])

### I Types of Personalisation:

1.1 *Customisation* (Explicit or Referential Personalisation) - The selection of options is under the direct control of the user who explicitly chooses to include or exclude options.

1.2 *Adaptive Personalisation* (Implicit or Inferential Personalisation) - The availability of options is based on knowledge about users gained from tracking user activity and/or other sources of user information. The system identifies items of potential interest to the user and controls what is made available to the user. Note, this form of personalisation may involve varying degrees of user awareness of, and involvement in, the process. Adaptive Personalisation is usually based on one of the following two technologies or approaches:

1.2.1 *Collaborative Filtering* - an algorithm which allows a service to identify items of potential interest to a particular user based on the preferences of other users with similar characteristics and/or activity records. (e.g. <http://www.amazon.com> )

1.2.2 *Rules Based Filtering* - a database driven system based on preset rules about relationships between items and user profiles. The user profiles may be created by the user, based on tracking user activity or based on data held elsewhere (e.g. student records, staff management information system or personnel record).

### 2 Outcomes of Personalisation

The possible outcomes of applying a personalisation function include:

2.1 changes in the way information is presented to the user; 2.2 changes to the content of the information presented (e.g. different search targets in a digital library);

2.3 availability of enhanced 'history' information for users;

2.4 different levels of access authorisation (e.g. a student on course x will only have access to y learning materials, or a student at z institution will only have access to resources to which z institution has subscribed).



## 11.2 Participants, respondents, interviewees, people who have helped

Veronica	Adamson	Independent e-learning consultant, UK
Sarah	Agarwal	ILRT, University of Bristol
Katie	Anstock	Talis
Anders	Ardo	Lund University
Jillian	Armstrong	Higher Education Academy
Anne	Atkins	Western Colleges Consortium
Chris	Awre	University of Hull
Bob	Banks	FD Learning
Andrew	Bevan	EDINA
Eddie	Boyle	EDINA
Paul	Browning	University of Bristol
Julie	Carpenter	Education for Change Ltd
James	Dalziel	Professor of Learning Technology, Macquarie University, Sydney, Australia
Michael	Danchak	Professor, Computer Science, Rensselaer Polytechnic Institute
Sara	de Freitas	Birkbeck, University of London
Grace	de la Flor	ILRT, University of Bristol
Lorcan	Dempsey	OCLC
Dana	Dietz	OCLC
Ian	Dolphin	University of Hull
Stephen	Downes	National Research Council Canada
Monica	Duke	UKOLN
Tom	Franklin	Franklin Consulting
Peter	Gietz	DAASI
Doug	Gowan	Chief Executive, Open Learning Partnership
Jillian	Griffiths	CERLIM, MMU
Fred	Gulden	Iowa State University Library
Debra	Hiom	ILRT, University of Bristol
Steve	Jeyes	ICONEX (Interactive Content Exchange) project for the University of Hull
Mary M.	LaMarca	Dartmouth College Library, USA
Donald M	Mackay	BIOME/RDN
Roddy	MacLeod	Heriot Watt University Library
Jon	Mason	education.au limited (national Australian agency for ICT in education & training).
Mark	McLaren	University of Bristol
Miroslav	Milinic	Head of information systems and applications department, University of Zagreb
Paul	Miller	Common Information Environment
Paul	Milne	EDINA
Dick	Moore	Ufi
Eric Lease	Morgan	Head, Digital Access and Information Architecture Department, University Libraries of Notre Dame
Lassi	Nirhamo	Educational Technology Unit, University of Turku, Finland
Lyn	Norris	Eduserv Athens
Marianne	Peereboom	Koninklijke Bibliotheek - National Library of the Netherlands
Francisco	Pinto	SPP/RDN and RTS/Oxford University Computing Services
Andy	Powell	UKOLN and RDN
Anne	Ramsden	The Open University
Sally	Rumsey	LSE / BLPES
Ron	Sawyer	Monash University
Anne-Marie	Scott	Management Information Services, The University of Edinburgh
Robert	Sherratt	University of Hull
Jasper	Tredgold	ILRT, University of Bristol
Theo van	Veen	Koninklijke Bibliotheek - National Library of the Netherlands
Kimberly	Voltero	WebCT
Mark	Williams	RDNC FE Manager

### 11.3 The questionnaire used for email interviews:

Dear xxxx,

I am working with <Neil Smith> <Seb Schmoller> on a study of "Personalisation in presentation services" for the JISC, who fund technology research, services and projects within the UK education community. <Neil> <Seb> has suggested we contact you with a very brief questionnaire to enhance our knowledge in this area. We are doing a literature survey, talking to selected people within the UK and have recently held three workshops for the UK academic community to participate in this process.

I'd be very grateful if you would answer the questions below. It should not take very long and we would very much value your input.

We hope to make a Web version of our report available in due course and will let you know when it is ready.

Thanks very much in advance for your help.

best wishes

Nicky Ferguson

A few questions about personalisation

=====

A. About you:

Name:

Role:

Your interest in personalisation:

Any interest or role that you have within education:

Are you happy for your comments to be quoted in our report? (please delete below)

Yes I am happy for my comments below to be quoted in the report

You may quote me but only anonymously

B. The issues:

1. Do users want or need personalisation? In specific cases? In general?

2. Is there a compelling business case for personalisation in your area of work ?

3. If you have used personalisation can you tell us what options you considered, and which you went for e.g.

Customisation (requires user input)

Adaptive Personalisation using user tracking

Adaptive Personalisation using data held elsewhere (e.g. staff records, MIS system etc)

... and was it a success (technically and in terms of uptake)?

4. Are there specific implementation issues to be aware of?

5. What would your message be to the academic community who are building

Web-based services for students and staff? Are there particular areas where personalisation should be considered or dismissed?

What "cautions" or particular constraints would you urge?

Any further comments you would like to make:

## 11.4 Acronyms Expanded

### Acronym    Expansion or explanation

<b>ACL</b>	<b>Adult and Community Learning</b>
<b>ADSL</b>	<b>Broadband connection technology (Asymmetric Digital Subscriber Line)</b>
<b>API</b>	<b>Application Programming Interface</b>
<b>APOD</b>	<b>Adaptive Personalisation based On Data held elsewhere</b>
<b>APUA</b>	<b>Adaptive Personalisation based on User Activity</b>
<b>CETIS</b>	<b>UK Centre For Educational Technology Interoperability Standards</b>
<b>CIE</b>	<b>Common Information Environment</b>
<b>DNER</b>	<b>The Distributed National Electronic Resource UK</b>
<b>EEVL</b>	<b>The Internet Guide to Engineering, Mathematics and Computing</b>
<b>FAQ</b>	<b>Frequently Asked Questions</b>
<b>FE</b>	<b>Further Education</b>
<b>FHE</b>	<b>Further and Higher Education</b>
<b>FHEI</b>	<b>Further and Higher Education Institution</b>
<b>FOAF</b>	<b>Friend Of A Friend</b>
<b>HE</b>	<b>Higher Education</b>
<b>HESA</b>	<b>Higher Education Statistics Agency</b>
<b>HR</b>	<b>Human Resources</b>
<b>ICT</b>	<b>Information and Communication Technologies</b>
<b>IPR</b>	<b>Intellectual Property Rights</b>
<b>J2EE</b>	<b>Java 2 Platform, Enterprise Edition</b>
<b>JISC</b>	<b>The Joint Information Systems Committee (JISC) supports further and higher education in the UK by providing strategic guidance, advice and opportunities to use Information and Communications Technology (ICT) to support teaching, learning, research and administration. JISC is funded by all the UK post 16 and higher education funding councils</b>
<b>JISC IE</b>	<b>The JISC Information Environment</b>
<b>JISC IEA</b>	<b>The JISC Information Environment Architecture (see Appendix 6)</b>
<b>JSR-168</b>	<b>The Java Portlet Specification</b>
<b>LDAP</b>	<b>Lightweight Directory Access Protocol. A set of protocols for accessing information directories</b>
<b>MLE</b>	<b>Managed Learning Environment</b>
<b>OPAC</b>	<b>On-line Public Access Catalogue (Library)</b>
<b>OSI</b>	<b>Open Systems Interconnection</b>
<b>RDN</b>	<b>Resource Discovery Network</b>
<b>RDN VTS</b>	<b>The RDN Virtual Training Suite</b>
<b>ROI</b>	<b>Return on Investment</b>
<b>RSLP</b>	<b>Research Support Libraries Programme UK</b>

<b>RSS</b>	<b>Really Simple Syndication</b>
<b>SOAP</b>	<b>Simple Object Access Protocol</b> < <a href="http://www.w3.org/TR/soap/">http://www.w3.org/TR/soap/</a> >
<b>SPP</b>	<b>The RDN Subject Portals Project</b>
<b>UDDI</b>	<b>Universal Discovery Description and Integration</b>
<b>URI</b>	<b>Uniform Resource Identifier</b>
<b>VLE</b>	<b>Virtual Learning Environment</b>
<b>WSDL</b>	<b>Web Services Description Language</b>
<b>WSRP</b>	<b>Web Services for Remote Portlets</b>
<b>XML</b>	<b>eXtensible Markup Language</b>
<b>XSLT</b>	<b>eXtensible Stylesheet Language Transformation</b>
<b>ZOPE</b>	<b>Zope is an open source Web application server - <a href="http://www.zope.org">http://www.zope.org</a></b>

## 11.5 Short author biographies

### 11.5.1 Nicky Ferguson

Nicky Ferguson now works as a consultant, he left the University of Bristol's Institute for Learning and Research Technology in 2003. He worked there for 10 years, initially as Fellow in Networked Information and subsequently as ILRT research director and acting director. He also directed a number of national and international research projects and Web-based services. He previously worked for the UK Economic and Social Research Council (ESRC). He has also worked successfully an actor and trainer and has set up two successful small businesses. He is currently involved with the UK's first new build Cohousing development.

### 11.5.2 Seb Schmoller

Seb Schmoller combines half-time employment as Executive Secretary of ALT with work as a freelance consultant. Whilst at the Sheffield College, Seb was responsible the college's overall learning technology strategy, and for its online learning provision. As a freelance, Seb has undertaken a range of projects including work on the Drafts for Public Comment of 3 of the first 4 e-learning related British Standards (BS 8426, BS8788, and BS8419); managing the TUC's online learning strategy implementation project; work on the recent DFES Scoping Study on the impact of e-learning in English Further Education; and work for Ufi on the tutor-support requirements of learndirect courses. <http://www.schmoller.net/>

### 11.5.3 Neil Smith

Neil Smith is Director of Knowledge Integration Ltd, a small company based in Sheffield specialising in open source software and consultancy. Prior to joining Knowledge Integration, he worked in a variety of roles for Fretwell-Downing, both in the UK and USA. He has had extensive involvement in collaborative R&D including a number of JISC eLib projects. His current projects include consultancy for BSI on new standards related to eLearning, IT For Me - a collaboration with University of Sheffield delivering personalised information for public library patrons in South Yorkshire, and assisting a range of library system vendors embed Knowledge Integration's toolkits into their products.

### 11.5.4 Contact Details & Further Information

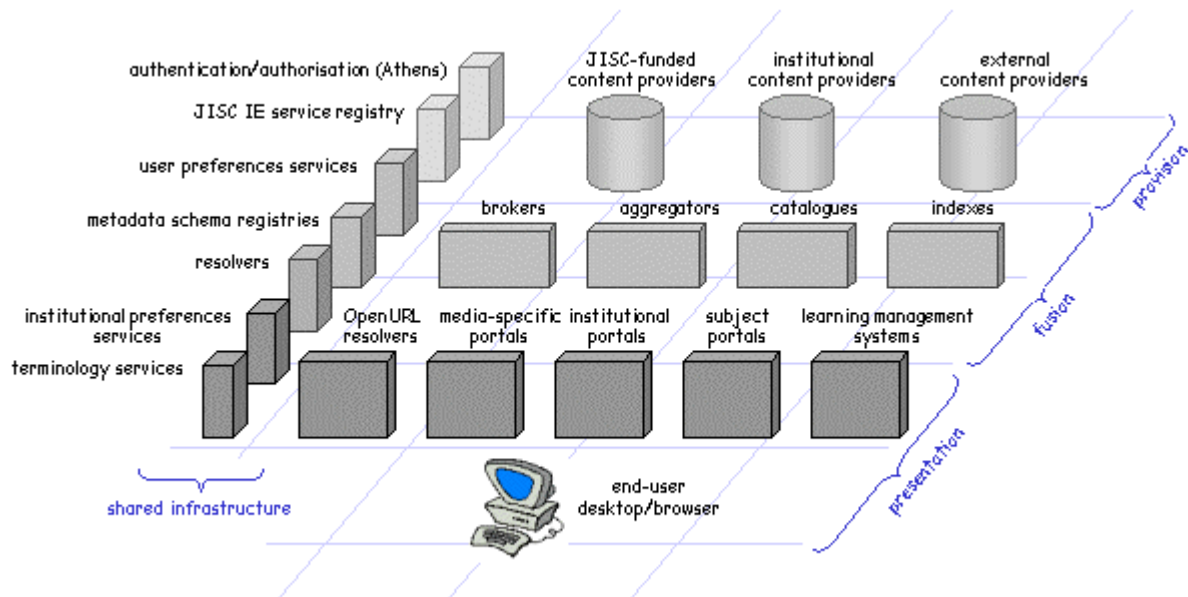
**Website address:** <http://www.therightplace.net/jp/>  
**Authors' contact:** Nicky Ferguson Email: [jp-study@therightplace.net](mailto:jp-study@therightplace.net)

## 11.6 JISC Information Environment Architecture

The [JISC Information Environment \(JISC IE\) technical architecture](#) specifies a set of standards and protocols that support the development and delivery of an integrated set of networked services that allow the end-user to **discover**, **access**, **use** and **publish** digital and physical resources as part of their learning and research activities.

The key standards and protocols specified in the technical architecture are listed in the [JISC IE Architecture Standards Framework](#).

Examples of the kind of activities supported by the architecture include:



- Integration of local and remote information resources with a variety of 'discovery' services (for example the RDN subject portals, institutional and commercial portals and personal reference managers) allowing students, lecturers and researchers to find quality assured resources from a wide range of content providers including commercial content providers and those within the higher and further education community and elsewhere.
- Seamless linking from 'discovery' services to appropriate 'delivery' services.
- Integration of information resources and learning object repositories with Virtual Learning Environments (for example, allowing seamless, persistent links from a course reading list or other learning objects to the most appropriate copy of an information resource).
- Open access to e-print archives and other systems for managing the intellectual output of institutions.

Examples of the kinds of content that are available through the JISC IE include scholarly journals, monographs, textbooks, learning objects, abstracts, manuscripts, maps, music scores, Internet resource descriptions, still images, geospatial images and other kinds of vector and numeric data, as well as moving picture and sound collections.

## 11.7 Charles Leadbeater's new script for public services

A new organising ideal for public services: comparison between traditional public sector, new public management, and personalisation. From *Personalisation through participation: A new script for public services*.

	<b>Traditional public sector</b>	<b>New public management</b>	<b>Personalisation</b>
<i>Public interest</i>	Defined by politicians and experts	Aggregate customer preferences/customer surveys	Dialogue between providers, funders, and users at all levels
<i>Performance objective</i>	Manage inputs Good administration	Inputs and outputs managed efficiently	Multiple agreed with stakeholders, users, including user experience and social value
<i>Accountability</i>	Upwards through departments to politicians	To politicians through market comparisons and contracts	To users directly as well as taxpayers, stakeholders and politicians
<i>Delivery model</i>	Public institutions Professional self-regulation Hierarchical departments	Contracted services	Mixed market of providers. Solutions assembled from a variety of sources around user needs.
<i>Ethos</i>	Patrician public services Technocratic	Market-based	Democratic, personalised, user-centric
<i>Users</i>	Deferential	Consumers, some self-service	Co-producers, creating solutions with professionals
<i>Manager's goals</i>	Satisfy political masters, professional self-regulation	Meet contracted performance targets	User satisfaction, wider social benefits
<i>Private role</i>	Minor, kept separate	Major role in service delivery	Public good comes from combination of public and individual initiatives
<i>Professional role</i>	Decide and allocate resources	Commission and monitor	Advice, broker, advocate, solutions assembler
<i>Classic organisational form</i>	Reithian BBC The Central Civil Service	Wandsworth Council 1980s Next Steps Agencies	SureStart, welfare-to-work, direct payments to disabled
<i>Source: Adapted from Creating Public Value. Strategy Unit.</i>			