IT Services – Help Or Hindrance To National IT Development Programmes?

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Abstract

Factors such as the rapid development of the Web and the onset of the open source software movement have led to renewed IT development within higher education. However the deployment of e-learning and related networked applications is reliant on the support of an institution's IT services department. Such departments will, quite rightly, place an emphasis on the need to provide a stable and secure service environment and will be aware of the support implications in deploying new services. There can be a danger that development work, including development funded by national and international funding programmes, can be hindered by institutional IT service departments. However IT services may feel that developers fail to understand the security, performance and support issues which deployment of applications is likely to entail. This paper provides case studies which illustrate successful efforts at bridging this divide. The paper concludes by arguing for greater common understanding and by describing an emerging framework which can help facilitate the deployment process.

Keywords: IT development, software deployment

1 About This Paper

Across many higher educational sectors there will be at national and international funding programmes to support IT developments in areas including e-learning and research support. The aims may be to evaluate new technologies and ideas, to digitise content, to provide middleware infrastructure applications or to embed new services or enhancements to existing services within the sector.

But how effective are such development programmes? What barriers may exist which hinder the effective deployment of new services? This paper explores one aspect: the relationships with IT service departments who are often responsible for deploying project deliverables into a service environment within an institution.

The paper reviews the IT environment which, in the UK higher education community, seeks to exploit national and international IT developments. A summary of the JISC's development environment is provided, followed by two case studies which demonstrate some of the challenges which need to be addressed in order to help ensure effective deployment of project deliverables. A framework is introduced which is being developed to help ensure that projects address potential barriers to service deployment. The paper concludes by outlining the differing perspectives of the development and service environments and argues for greater shared understanding across these groups.

2 The IT Services' Perspective

The 1970s and 1980s was the era of the mainframe computer. In this period IT Services were the main driving force for institutional IT strategies. This was a time of centralisation, large capital budgets and, in the UK higher education sector, seven year funding cycles for mainframe computer procurement, with earmarked funding from government bodies. Hardware was expensive as was software (the open source software movement had not yet arrived) and IT skills were a scarce and highly specialised resource. User Groups did have some input into the planning and procurement process, but it was not normally possible for departments to go their own way if they were in disagreement with the institutional strategy.

Life nowadays is very different. Mainframe computers have disappeared; instead departments can afford to purchase IT systems from departmental budgets; gain financial benefits from discounts negotiated for academic institutions or can deploy powerful open source software applications which require no licence costs. Of course, not only members of staff but also our students and children have access to networked PCs and increasingly will have IT skills to make effective use of them. Even access to hardware and computer networks is no longer restricted to the University campus, with the PC becoming a standard commodity for students and take-up of broadband increasing within student housing – or available in the local library of branch of Starbucks.

Today's environment appears to provide departments with strong autonomy to develop solutions relevant to their own needs and to allow IT systems to support their own departmental needs in teaching, research and administration, rather than amend departmental approaches to reflect centralised software.

However this departmental and, indeed, individual, autonomy poses its own challenges. Security in the Internet era, for example, is now an issue which all IT users need to be aware of. At an institutional level there is a need to monitor and mange the overall IT costs to the institution; and to be aware of issues such as sustainability; repurposing and interoperability; etc. IT Service departments have a clear need to focus on institutional needs, to prioritise resources effectively, to provide a reliable, secure IT environment to support mission-critical services and to ensure that appropriate levels of support can be provided. However there is a danger that such requirements, and the culture which underlies this, could inhibit the development of new activities, such as JISC's development programmes.

3 JISC's Development Programmes

The JISC (Joint Information Systems Committee) funds development programmes for the UK higher and further education communities which help to provide proof-of-concept for emerging new technological areas together with supporting the development of key areas, such as e-learning and support for the research community. An important aspect of JISC's development work is the Information Environment (IE) [6]. This ambitious plan seeks to provide seamless access for users to scholarly resources provided across the community.

JISC also fund development programmes which help to digitise resources; provide access to digitised resources for use in teaching and research and support the use of application environments within institutions. JISC also supports the national infrastructure through the development of middleware systems which address areas such as authentication and authorisation.

The JISC's Strategy document [7] provides the framework for its service and development programme and how it seeks to support the needs of the higher and further education sectors. In order to implement this strategy JISC has funded several development programmes including 5/99, FAIR and X4L.

4 QA Focus - A Support Infrastructure For JISC's Development Programmes

JISC recognised the importance of providing an infrastructure which would help ensure that project deliverables are functional, widely accessible and interoperable by funding the QA Focus project to support programmes including 5/99, FAIR and X4L. The QA Focus team recognised that the effective deployment of projects deliverables into a service environment was an example of interoperability, and so addressed this area in their work. A lightweight QA framework was developed which has been described elsewhere [9].

During the course of its work QA Focus became aware of several potential barriers to the development of interoperable deliverables; for example, in some quarters there appeared to be a lack of awareness of the JISC's vision for the Information Environment of the standards framework, of the advantages and disadvantages of various technical solutions or of mechanisms for checking for compliance with standards and best practices. These issues seemed to reflect the culture within the IT services in which some of the project teams were based. In order to address such difficulties, an effort was made to inform the wider IT services community of a quality assurance approach to building digital library services.

In other cases potential difficulties in deploying project deliverables within institutions had been recognised and appropriate measures taken. We will now describe two case studies which illustrate this.

5 Case Study 1: Artworld

Artworld [2] was a consortium project funded by the JISC 5/99 programme. The consortium consisted of The Sainsbury Centre for Visual Arts (SCVA) at The University of East Anglia (UEA) and the Oriental Museum at the University of Durham. The main project deliverables were a Web site combining parts of the catalogues and object images of the two collections and a set of teaching resources.

Artworld in common with many development projects had to balance funder requirements; the technical, information and development needs of the project and local institutional technologies. In the early stages of the project the search for technological solutions for ArtWorld were particularly difficult.

Most of the Web-based information resources investigated employed a straightforward 'catalogue-on-the-Web' interface that provides user searching of an existing database. Although this was also the main provision and deliverable for Artworld, there were additional goals including finding ways for users to expand, contribute and ultimately change the initial product. The project had to keep in mind JISC guidelines which put limitations on software and interface design, and thus solutions were looked for that would be open-source, could meet accessibility guidelines, and could ensure future-proofing for W3C standards.

During this early planning stage of the project the main host institution, the University of East Anglia, was developing its policy for web application projects such as Artworld and Virtual Norfolk. Those plans were not fully developed although the suggested solution was WebObjects, a content management and web application package. Unfortunately, at that point in time technical support was not fully developed and the lack of a database solution for it meant that the project had to move on to find other solutions for our technical infrastructure, in order to meet deadlines imposed by the project plan.

A number of systems were considered including PHP Website, Index + and Cocoon. The first and last being open source solution whereas Index + is a proprietary solution. In addition database technology that could support the web front end was investigated. MS SQL, MySQL, PostGreSQL and Oracle were considered. All of the solutions could provide for the project requirements but ultimately only a combination of Cocoon and PostGreSQL could fulfil all of the projects requirements.

In the proceeding brief description it is clear that technology selection was a primary activity in the early stages of the project. However, a part of the JISC requirements was to attend "cluster" group meeting. This communication structure provided for discussion and issue resolution amongst that subset of 5/99 projects primarily concerned with still images. An important ingredient in these groups was representation for JISC advisory bodies such as TASI (Technical Advisory Services For Images) and UKOLN and the service organisation that would ultimately host the data collections produced by the projects VADS.

As these discussions progressed it became clear that the projects and the service organisation were all using very different technologies. The Artworld project team had a combination of experience, including business survey design, marketing and previous experience in the data provision that allowed for a potential solution to be found. The decision was a relatively simple one and it was taken to deliberately persuade other projects to use the same

technology as Artworld. This was reasonably successful in that five projects including one at VADS (Visual Arts Data Service) took up this technology combination. VADS's parent organisation, the AHDS (Arts and Humanities Data Service) also investigated Cocoon and in a recent job advert requested this as part of the skill set of applicants.

Whether ultimately this strategy will prove successful is impossible to say but it does lead to some useful ideas for developing solutions.

1. The communication structure or channels provided by JISC allowed for the early recognition of a problem.
2. The broad based knowledge and experience of the project team meant that the problem was not only recognised but a resolution was attempted.
3. Individual projects and the wider community can gain benefits from sharing of experiences and the solutions deployed.

The Artworld team actively address the third point by documenting their technical approaches in a QA Focus case study document [3] and a more detailed description of the Cocoon software in a VINE article [5].

At one stage during the Artworld development potential hosting services had expressed concerns over the unusual solutions which had been adopted. However Artworld have clearly recognised this as a factor and had successfully addressed such concerns.

6 Case Study 2: RDN-include and RDNi-lite

An interesting approach which sought to provide a simple syndication tool has been carried out by the Resource Discovery Network (RDN). The RDN-include tool provides access to subject gateways and allows the institution to control the look-and-feel of the gateway. However, as this tool is implemented as a CGI script it requires system administration privileges in order to be deployed. It was felt that system administrators may be reluctant to deploy the tool, due to concerns over potential security problems.

In order to address such concerns RDNi-Lite was developed, which provides similar functionality but, as it is implemented using JavaScript, can be used by an HTML author: no special system administration privileges are required. This example illustrates an approach which acknowledges potential deployment difficulties and provides an alternative solution. Further information on this approach is available [10].

7 A Framework For Service Deployment

The QA Focus work was informed by several case studies such as those described above. This has helped us to identify a number of important areas of advice which are listed in a QA Focus briefing document [15] and summarised below:

- The technical architecture of the project should be documented.
- Any deviations from accepted standards and best practices should be documented.
- Any unusual or innovative aspects should be documented.
- Developers should identify potential hosts for the project deliverables and seek to engage in dialogue with them.
- Developers should gain an understanding of potential barriers which may be of concern to possible hosting services and seek to address such concerns.
- Developers should provide the range of documentation which is needed to allow the projects deliverables to be easily deployed into service.
- Developers should be prepared to 'let go'.
- Developers should be encouraged to share experiences with others.

There is a need, however, to ensure that this approach is embedded within IT development processes. There are ways in which funding bodies can seek to achieve this. In the early stages of a funding programme the funders can provide advice, workshops, etc. which ensure that projects are aware of potential barriers and give examples of best practices. A more formal approach would be to ensure that these issues are addressed when institutions submit funding proposals. For example, documents could requests that proposals:

- Identify potential barriers to the effective deployment into service of the project deliverables
- Describe approaches which will be taken to ensure that these barriers can be addressed
- Identify potential hosts of the project deliverables
- Describe the approaches which will be taken to develop effective communication channels with potential hosts.

We feel that ensuring potential bidders are required to give thought to such issues at an early stage should help them to appreciate the bigger picture and recognise that projects aren't funded in isolation, but as part of a wider development programme. By ensuring that a support infrastructure supports the development work there will be a greater likelihood that project deliverables can be deployed into service with a reduction of unnecessary effort.

8 The Challenges Of Internet Technologies

8.1 Availability Of Networked Applications

In this paper we have provided examples of how development projects can seek to minimise potential barriers to the deployment of the project deliverables into a service environment. However as well as funded IT development programmes institutions will also need to address the challenges provided by the wide range of networked applications, many of which can be downloaded for free. In

this situation there is no infrastructure in place to mediate between the needs of the developer and service provider and no contractual arrangements in place to ensure that best practices and being implemented.

8.2 Addressing The Challenges Of Internet Technologies

A joint UCISA and UKOLN workshop [14] was organised in November 2004 which sought to address the particular issue of collaborative Internet technologies. At the workshop speakers provided case studies which outlined how technologies such as Blogs and instant messaging are being used to support teaching and learning and research within our institutions. As described elsewhere [11] the event explicitly sought to address potential barriers to the deployment of such technologies.

We feel there is a need for similar events which provide an opportunity to facilitate discussions concerning not only the potential for new technologies but also accompanying dangers. A JISC InfoNet/ALT workshop was held in February 2005 which exemplifies this approach. The event "*explore*[s] *the cultural issues involved in connecting learners and institutions, and how to overcome traditional barriers to progress with e-learning*" [1]. The approach taken at this workshop, which tries to bring together two communities in an attempt to foster mutual understanding, could usefully be applied to the IT development and service provider communities. As well as the issues covered in this paper, which has focussed on the IT *development* perspective, there is a need to address concerns of *service providers*, such as security, support, legal, etc. issues.

8.3 Skype – A Challenge To Be Addressed

The Skype Internet telephony application provides an interesting example of an application which is currently growing in popularity but which is also raising concerns within some institutions.

Skype is a VoIP (Voice over IP) application which can provide free telephone calls to other Skype users and cheap calls to landlines and mobile phones. Skype can also be to set up conference calls with up to five participants. Skype enthusiasts appreciate the quality of the sound which is often provided and the additional benefits which use of this application can provide over conventional telephone calls (e.g. accompanying instant messaging and collaborative chat rooms, display of contacts who may be online, etc.). It can be particularly valuable for those who spend significant amounts of time travelling, as it can be used to easily keep in touch with colleagues. Skype can also be used to allow remote participants to listen in to talks at conferences, participate in meetings, etc.

Despite the potential Skype seems to provide objections to its use have been raised and in some institutions its use has been banned. Such objections include:

- Skype licence conditions gives it the rights to download additional software, which could include spyware.
- The company is linked with KaZaA, a peer-to-peer file-sharing application which is renowned for degrading the performance of PCs through its use of spyware.
- Skype is a peer-to-peer application, and peer-to-peer applications are often used for downloading copyrighted materials, including music, videos, pornography, etc.
- Skype is a closed application, which uses a proprietary protocol rather than the SIP (Session Initiation Protocol) standard.
- Skype unfairly makes use of bandwidth provided by others.
- Skype's ease of installation and use conflicts with the need for institutions to be able to manage network access.
- The rapid growth of Skype will degrade network performance.
- Skype may infringe an institution's acceptable use policy.

Organisations including CERN [4] and the University of Minnesota [12] have banned or discouraged use of Skype. However others have argued that such criticisms are inappropriate, and there has been a long debate on this topic on Slashdot [13]. It could be argued that here are valid counter-arguments to the points given above:

- There is no evidence that Skype does contain spyware and such licence conditions (if still included) can be used for benign purposes (e.g. fault reporting software).
- It would be inappropriate to make such condemnations based on who a person knows or where they used to work. There should be firm evidence to justify a ban.
- Peer-to-peer applications can be used for legitimate purposes and within the e-Science and Grid communities there is much development work in progress based on peer-to-peer applications.
- Although Skype may be closed, it currently provides richer functionality and better performance than open VoIP applications.
- Skype use of bandwidth provided by others could be regarded as innovative. Other peer-to-peer applications provide similar functionality and, in practice, the network usage may not be significant.
- There is a need to balance end users' requirements with service providers' management requirements. It would be inappropriate for service providers to unilaterally ban software unless there is a proven security or performance concern.
- In the 1990s some argued that Web browsers should be banned arguing that they would degrade network performance!
- An institution's acceptable use policy should not be cast in stone, but needs to be developed in order to respond to changes.

The points given above are not intended to provide a clinching argument as to whether Skype should or should not be permitted within an institution. The intention is to illustrate that, in many cases, there will be arguments and counter-arguments. The important point to be made is that there will be a need to provide a forum for such debate to be held. In today's networked environment an autocratic ban on software can not only lead to unnecessary criticism of a service department (with users saying "IT Services have banned use of X" rather than "IT Services are protecting our network") but can lead to knowledgeable users using alternative approaches for deploying the software.

9 A Need For Shared Understanding

We have given a number of examples of ways of tackling barriers to the deployment of project deliverables and Internet technologies. In addition to technical approaches which have been described there is a need for a broader approach which will ensure a shared understanding.

9.1 The Developers Perspective

9.1.1 E-Learning Is Not Word Processing!

Some of the tensions between innovative e-learning developers and IT service staff will be due to differences in understanding of the nature of learning. IT support staff are familiar with the role of software in areas such as word-processing, spreadsheets, graphics, statistical analysis, etc. In these areas there is a well-understood process of identification of software requirements, budgetary and support issues followed by evaluation and selection of an appropriate solution which can then be fully supported. However the process for the selection of applications to be support learning is much more complex. The ultimate aim of a word processor is to create marks on paper while the aim of a statistical analysis package may be to provide a summary of numerical data. The aim of an e-learning application however is to help to support a student's learning. This learning process will reflect the pedagogical approach taken and will be influenced by the academic discipline, the approaches taken by teachers, students' learning styles, etc. There may be a lack of understanding of these issues by staff in IT services which may lead to tensions with IT services staff finding it difficult to understand why am existing application cannot be used to support the learning process.

9.1.2 Innovation And HE

In the higher education sector academics will often seek to innovate in their teaching and research. Clearly IT has an important role to play in this process. There needs to be an awareness of this approach. There is a need to be aware that, in teaching and research areas (although possible not in administration) it is unlikely that there will be an ideal application which will provide a stable environment to support our learning and research.

9.1.3 Some\Level Of Risk May Be Acceptable

There will be some level of risk when using innovative approaches to learning. There will also be some risk when deploying new software applications, especially networked applications. Clearly issues such as security, privacy, etc. need to be treated seriously. However it would be a mistake to aim for a completely safe environment. Existing widely deployed technologies are known to have their flaws. The SMPT email protocol, for example, is flawed and allows email addresses to be spoofed. The Microsoft Windows operating system suffers from well-documented security loopholes (such flaws are, of course, not restricted to Microsoft, however; security alerts have been raised for Linux, Apache, Firefox,, etc.)

There is therefore a need to accept that we can't provide a perfect, completely-secure IT environment. We should be prepared to accept some level of risk-taking.

9.1.4 AUPs Are Not Cast In Stone

Although institutions will\ have a need to developed acceptable use policies there is a need to recognise that these policies will have to evolve as technologies develop and usage patterns for the technologies change. This is particularly relevant within the educational sector as many academics will seek to exploit the educational benefits of new technologies rather than just relying on established tools.

9.2 The IT Service's Perspective

It would be wrong to suggest that there needs to be a one-way traffic in understanding – those involved in IT development work have an equal need to understand the needs of those involved in support work.

9.2.1 Innovation To Fulfil A Need

Support staff may feel that early adopters and advocates of emerging technologies promote such technologies in isolation, without identifying the solutions which the technologies should be solving. There is a need for the development community to gain an understanding of the needs of end users and to ensure that applications address those needs.

9.2.2 Understanding Of Service Deliverer's Concerns

There is a need to not only to be aware of issues such as security, privacy, support, etc. but also to be able to demonstrate that such issues have been address within the development process.

9.2.3 Innovation May Fail

Developers are often early adopters of new technologies. However the IT environment is littered with examples of innovative ideas which failed to take off. Understandably IT Service departments do not want to be left supporting innovations which have failed to reach critical mass.

9.2.4 Need For User Support

IT Service departments will need to ensure that appropriate levels of user support are provided. This can include documentation, training, FAQs, etc.

10 Conclusions

This paper described approaches of addressing potential barriers to the deployment of project deliverables within the context of a national digital library initiative, and broadened

the discussion to cover the challenges to be faced in deploying applications freely available on the Internet.

Although IT developers and IT service providers may have differing priorities and interests, we are all part of the same community and can all benefit from a shared understanding of the issues we face. We hope this paper has outlined some approaches which can help facilitate a shared approach.

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Acknowledgments

We are grateful to the JISC for funding the QA Focus, Artworld and RDN-Include examples described in this document.