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JISC

JISC Final Report

Title Page

Work-with-IT

JISC Study into Evolution of Working Practices

Final Report

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Executive Summary

Technology is increasingly being used to underpin business processes across teaching and learning, research, knowledge exchange and business support activities in both HE and FE. The introduction of technology has a significant impact on the working practices of staff, often requiring them to work in a radically different way. Change in any situation can be unsettling and problematic and, where not effectively managed, can lead to poor service or functionality and disenfranchised staff. These issues can have a direct impact on institutional effectiveness, reputation and the resulting student experience. The Work-with-IT project, based at the University of Strathclyde, sought to examine changes to working practices across HE and FE, the impact on staff roles and relationships and the new skills sets that are required to meet these changes.

The initial one-year project (phase I), commissioned in 2008, examined the effect of technology on working practices and staff attitudes and the resulting impact on staff roles and responsibilities. JISC then commissioned phase II of Work-with-IT in 2009 to examine changing staff roles and responsibilities from a wider perspective through exploration of the remaining PES(T)LE dimensions – political, economic, social, legal and environmental. Finally, since at the time of commissioning of phase I, the use of Web 2.0 technologies within FE and HE was still in its infancy and as a result it was too early to analyse the effect of Web 2.0 technologies on the evolution of working practices, a third and final phase was commissioned in October 2009 to investigate the effect that Web 2.0 technologies are having on the evolution of working practices and staff attitudes, and the resulting impact on staff roles and responsibilities across FE and HE.

As the Work-with-IT project was concerned with the impact of technology on staff, the overall methodological approach was based on that of complex socio-technical systems. Phase I explored the effect of technology on changing working practices and their impact on staff through desk research, consultative workshops and a series of ten case studies which explored innovative approaches to technology-enhanced working across a range of HE and FE institutions. The workshops were used to generate an overall picture of the types of changes that are occurring and the resultant impact on staff. The case studies, which were undertaken directly by the institutions and focused on personal experiences, produced a series of vignettes where individuals considered the impact of the change. This was complemented by an analysis of the impact of the technology-enhanced working practice on the institution and its staff development needs. The final step in phase I was the development of Advice and Guidance material aimed at staff development professionals and change managers within institutions. Phase II then used PESTLE and scenario exploration workshops to explore how working practices, staff roles and responsibilities might evolve over the next five years. The original case studies were also revisited to explore how they might evolve. In phase III, activity reviews were used to investigate the effect that Web 2.0 technologies are having on staff and their impact on roles and responsibilities.

Five key currently trends in technology-enhanced working practices can be identified – *Life without borders, the electronic office, Technology-enhanced delivery, Digital students* and *Changing loci of control and relationships*. The evidence suggests that staff attitudes to

technology-enhanced working practices are in general positive, with a prevailing view of technology as 'enabling' although dichotomous reactions to the same change were expressed by different individuals. Evolution of roles was also found with development of hybrid roles and local experts. Staff relationships are also undergoing significant change as individuals increasingly work in collaborative teams and participate in wider Communities of Practice. Significant changes to the skills required to work effectively in the new technology-enhanced environments can also be identified. These are broadly categorised into skills for coping with change, social and relationship skills, learning skills and IT-related skills.

Look to the future, phase II identified a wide variety of factors are likely to affect the sector over the next five years. Economic factors are viewed as the most dominant overall with the current recession and resultant reduction in funding and increase in demand being the primary influences. From a political perspective, the potential change in government introduces a significant uncertainty as this may change government and funding council policies pertaining to funding, lifelong learning, research and knowledge exchange amongst others. Social factors, especially student and staff expectations and changing demographics, are also expected significantly to affect future HE and FE provision. From a technological perspective, new working practices will primarily be driven by the availability of technological solutions along with evolving Web 2.0 practices. Legal and regulatory compliance relating to copyright, IPR, data protection, health & safety discrimination and human rights will continue to impact working practices. Finally, availability and fitness of estate and the need to reduce carbon emissions are likely to be the most significant environmental factors. Over the next five years, these PESTLE factors are likely to lead to four general trends within the sector relating to institutional strategies and ethos – *lean thinking*, *flexible learning*, *risk management* and *collaboration & sharing*. Individual working practices will evolve depending on institutional strategies and ethos and the general working practices trends – life without borders, the electronic office, technology-enhanced delivery, digital students, and changing loci of control and relationships.

The six 'big ideas' associated with Web 2.0 – individual production and user-generated content, harnessing the power of the crowd, data on an epic scale, architecture of participation network effects and openness [9] – are already significantly impacting working practices, roles, responsibilities and relationships within HE and FE. While these ideas, in general, fit well with existing pedagogical and academic practice, the openness, architecture of participation and aggregation of results afforded by Web 2.0 presents both opportunities and challenges. Firstly, while it affords staff with more options to work innovatively with technology, this freedom is countered by the need to take more personal responsibility for the effects of their Web postings and interactions. Secondly, working with Web 2.0 technologies requires a cognitive shift, by both individual staff and institutional management, from previous data-led technological approaches to bottom-up approaches designed to leveraging emergence within the social Web. Thirdly, effective use of Web 2.0 means being part of a crowd. The use of particular Web 2.0 technologies will therefore be dictated by trends within specific projects, professional or disciplinary communities. Fourthly, Web 2.0 will further accentuate the blurring of boundaries between work and social identities. Staff may need support to find an appropriate "voice" within social and collaborative communities.

Finally, inexperienced staff can quickly get left behind potentially creating a novice-expert Web 2.0 divide.

The project concluded that, where the introduction of technology-enhanced working practices is well managed, it brings benefit to both institutions and the individual staff involved. Change is increasingly the norm and this will continue into the foreseeable future. Increased bottom-up adoption of Web 2.0 technologies is identified as potentially bringing significant change in the near future and may challenge existing processes, policies and cultures. There are however some key areas of concern.

Five key areas are identified where change is required if institutions are to effectively embrace and embed technology-enhanced working practices. (1) A more holistic approach needs to be adopted, where institutions ensure that organisational structures support timely revision and linkage to strategies, an understanding of the complexity of issues at the highest level and strategic leadership which empowers and encourages staff to evolve their working practices in line with strategy. (2) Human resources (HR) policies, procedures and practices need to be updated to effectively support and develop evolving staff roles. Without this, institutions will be unable to effectively capitalise on the opportunities afforded by emerging technologies or be sufficiently agile to respond to changing PESLE factors in a timely and effective manner. (3) While staff development is in general effective when it comes to 'hard' aspects such as how to use particular technologies, significant work is required to support development of 'soft' skills such as relationship management, boundary management, and understanding the potential and impact of technologies. (4) A more holistic approach to change management needs to be adopted which involves key institutional functions such as staff development, HR, IT services and change management from the outset of development projects. (5) Horizon scanning needs to be embedded in institutional processes and procedures if institutions are to be successful in the ever evolving environment.

The main recommendation is that JISC considers how these five key areas of change could be affected and improved practice piloted and embedded throughout the sector. Further work on effective horizon scanning, innovative practice lifecycle management, business cases and development of a skills and competencies assessment toolkit is also suggested. Finally, it is recommended that JISC work with the relevant sector professional bodies and associations to develop appropriate advice and guidance materials in order to improve embedding of effective practice within the UK HE and FE sector.

Table of Contents

1	Background and Overview.....	9
1.1	Background	9
1.2	Aims and Objectives.....	11
1.3	The approach adopted	13
1.4	Scope and content of the report	14
2	Exploring technology-enhanced changes to working practices	16
2.1	Changes to technology-enhanced working practices.....	18
2.2	Changing roles and relationships	27
2.3	Skills requirements	30
3	The Phase I Case Studies	32
3.1	Digital Fluency – Sheffield Hallam University	35
3.2	eMentors – Oaklands College	36
3.3	Enhanced Vocational Training at Work – West Lothian College.....	37
3.4	e-Research – King’s College London.....	37
3.5	Location Independent Working (LIW) – Coventry University Enterprises Ltd. ..	38
3.6	Online Course Delivery in a Disperse Environment – UHI Millennium Institute	38
3.7	Paperless Admissions – Coventry University.....	39
3.8	Part-time Working & Technology – Open University	40
3.9	Knowledge Exchange across Rural Borders – NationalRural Knowledge Exchange	40
3.10	Regional Management Information Systems.....	41
4	Advice and Guidance.....	42
4.1	Recommendations for Skills Development.....	42
4.1.1	Coping with change	44
4.1.2	Social and relationship skills.....	44
4.1.3	IT-Related Skills and Training.....	45
4.2	Effective practice recommendations	48
5	Exploring the evolution of technology-enhanced working practices	50
5.1	PES(T)LE factors	50
5.2	Potential key trends within the sector.....	63

5.3	Reflections of the PESTLE analysis	69
6	The effect of Web 2.0.....	74
6.1	Changing working practices	75
6.2	Changing roles, responsibilities and relationships	80
6.3	Skills and Competencies	84
6.4	Drivers and constraints.....	86
6.5	Potential future use and impact.....	90
6.6	Reflections on the effect of Web 2.0 technologies	92
7	Conclusions, implications and recommendations	98
7.1	Conclusions.....	99
7.1.1	Current trends in technology-enhanced working	99
7.1.2	Working in a Web 2.0 world.....	99
7.1.3	The future: drivers and institutional trends.....	100
7.1.4	Evolution of staff roles and responsibilities.....	100
7.1.5	Critical success factors	101
7.1.6	Key areas where change is required	101
7.1.7	Timeliness and relevance of the Work-with-IT study	102
7.2	Summary of main implications of the evolution of working practices	102
7.2.1	For Staff	102
7.2.2	For Institutions / Senior Management.....	103
7.2.3	For change managers.....	104
7.2.4	For staff developers and HR managers.....	105
7.3	Recommendations	106
7.3.1	Key areas where change is required	106
7.3.2	Areas of additional work	107
7.3.3	Embedding, support and dissemination.....	109
8	Appendix A.....	110

1 Background and Overview

1.1 Background

Over the past 20+ years technology has spread into almost every corner of life within HE and FE - from a computer on every desktop through virtual learning environments (VLEs), electronic databases and reference libraries to electronic admission, registration and fees payment. Despite the extent of this reach, the ever-increasing processor power, miniaturisation and frequency of new generations of software mean that technological change is increasingly the steady state of our working lives.

These new technologies offer the potential to enhance the delivery of the business functions of education, research, knowledge exchange, libraries and IT services and administration found within HE and FE¹ through, for example, enhanced student-focussed services, sharing of global research resources, improved access to Intellectual Property Rights (IPR) and increased efficiency. The introduction of such technology-enhanced services and business processes significantly impacts upon the working practices of staff who deliver these services as their day-to-day working practices, internal relationships and indeed roles, may change. Unless these staff members are supported through the sometimes radical changes required of them, the effective exploitation of new technology-enhanced business processes and capabilities will not necessarily follow.

As the JISC infoNet Toolkit on Change Management [10] acknowledges, change within an organisation occurs within a complex system, driven by internal dynamics arising from the interaction between culture, processes and people. Add to this the influence of external environmental factors such as economic drivers, student numbers or legal requirements, and it makes change highly unpredictable and difficult to manage. Technological-driven change is no exception. Failure to appreciate that there are additional consequences for a new VLE or central institutional records management system, other than simply a change in processes and the need for skills updates, often leads to unpredicted issues such as loss of job satisfaction, lack of confidence or distrust in a now centrally provided information or service.

Given these significant changes and potential issues, the JISC Organisational Support (JOS) committee identified the need for more accurate and up to date information regarding changing staff roles, relationships and associated skills which have been brought about by these new technologies. In their ITT, JISC identified three key questions that need to be addressed in order to support institutions in their effective exploitation of new technology.

1. *How has the adoption of new technologies and practices brought about changes within institutional workforces, and how have these changes affected staff attitudes towards their work and also the student experience?*

¹ While research is not a function within FE, Knowledge Exchange in terms of the social cultural links with local communities is often an important part.

2. *How have staff roles, relationships and working practices adapted to accommodate these changes?*
3. *What new sets of skills are required in order to work in new ways that exploit the benefits (or overcome barriers) afforded by new technology environments?*

Some relevant work had already been undertaken through previous JISC funded projects. The impact and effects associated with eLearning were perhaps most widely explored through JISC studies of the X4L, e-Learning Pedagogy and e-Learning Capital Programmes, which consider the effect on the student body and learning experiences (e.g. CAMEL Tangible benefits of e-Learning Project) and on academics (e.g. Reflections from SURF X4L). The studies and anecdotal evidence illustrate that, in addition to radically changing the learner experience and creating new roles such as Learning Technologists and Repository Managers, there have also been other significant effects on staff. For example, a member of staff's role may change from expert to learner in relation to the technology involved in that role, leading to a perceived loss of face and reluctance to seek help, or the 24x7 availability of the web may lead to an expectation by students that out of hours replies and constant VLE access will be readily available, neither of which can be guaranteed given institutional resources and cultures.

Other areas relating to technology-enhanced change were less well understood. Anecdotal examples of the issues that have arisen in other business areas are briefly reviewed below to highlight the types of factors that the Work-with-IT study needed to consider in order to answer the study questions.

New technology affords changes to existing processes, often designed to increase efficiency or to tighten up on legal or regulatory requirements. For example, there is a move towards combining Human Resources (HR) and payroll databases to minimise data input and reconcile multiple data holdings, which results in staff from multiple departments being involved in the process flow. This has an impact beyond simply changing how HR data is accessed and processed; distrust may arise due to perceived cultural differences within departments. For example payroll staff, traditionally responsible for the input of personal payroll details, may not regard HR staff as being rigorous enough to ensure the provenance of the data. Further, the new workflow, although tightening up on lax administrative procedures, may result in a reduction in flexibility and discretion. For example, the allocation of computer accounts may also be tied to the HR database, so while a new member of staff may start immediately following formal acceptance of a job offer, a computer account cannot be allocated until all the necessary information is in the HR system and then picked up by IT staff. This can lead to frustration both for the new member of staff and the IT administrator who, despite being supplied with a letter of appointment, cannot actually allocate an account. Thus, in this example the implications of change extend beyond the staff directly involved in maintaining the HR database.

Changing business processes may also lead to a change in roles. For example, with the move towards shared data services, the traditional role of the catalogue librarian is changing. For some, this leads to a feeling of down-skilling. For example, this is evident in the 'Google generation' where staff and students now seek quick and dirty searches,

lowering the standards both of literature searches and the librarian's service, which traditionally provided job satisfaction through the 'hunt' for materials and resources. However, for others new opportunities arise. The traditional role of catalogue librarian is changing, although it remains central and critical to the successful delivery of information services. For example, cataloguing (or application of metadata) is increasingly undertaken within new environments such as the institutional repository. Further, there is anecdotal evidence that the increasing technological environment is also leading to pastoral provision by librarians. For example, staff or students may approach librarians with information problems that are in fact indicative of serious issues arising from a lack of technology literacy. In such cases librarians may take on a duty of care, mediating and arranging academic support.

The JISC Location Independent Working Project provides one illustration of the time- and location-independent working arrangements that technology affords. While such working patterns may appear to offer considerable benefits in terms of improvement to work-life balance by removing long commutes, the gradual eroding of the distinction between work and non-work time due to constant availability may instead lead to increased stress. Further, institutional health and safety procedures must be extended to consider the home environment. While technology affords the opportunity for such flexible working, as the HFECE Flexible Employment Options Project [11] examines, the impact extends beyond individual staff, requiring institutions to examine staff employment and development, and associated policy implications.

Technology is also having an impact in unexpected areas. For example, to increase future efficiency, some organisations are digitally scanning all documents, creating new administrative assistant jobs – brand new roles. Staff with manual jobs increasingly have to order parts or manage their work allocation online. This almost mandatory requirement for information literacy skills is particularly disadvantageous to older workers, especially those returning to work after a career break.

Finally, the advent of Web 2.0 technologies potentially poses significant challenges. While such technologies allow individual staff and students to be innovative and agile, they circumvent traditional support structures. The impact on traditional IT roles as well as institutional support structures and quality control is potentially far reaching.

The preceding examples highlight that the support required for staff is more than just to facilitate development of information literacy². Means of supporting staff in changing roles and relationships, in managing expectations and in change itself also needs to be addressed.

1.2 Aims and Objectives

The overall aim of the Work-with-IT project was to gather up to date information on changing staff roles, relationships and associated skills brought about by the impact of the adoption of

² See the outputs of the JISC Staff Information Skills Set Project
http://www.jisc.ac.uk/whatwedo/programmes/programme_jos/project_siss.aspx

new technologies within UK HE and FE. The focus was not on information skills or skills for harnessing technology per se, but rather on the impact that these new ways of working, arising from adopting ICT and technology-supported practices, are having on staff.

The project which ran from February 2008 until December 2009 consisted of three phases.

Phase I

The primary objective of Phase I was to explore the impact of technological change on working practices and roles in UK HE and FE and to investigate how individuals may need to adapt to fully exploit new business processes and capabilities. Specific Phase I objectives were:

- To assess the impact and effect that new ways of technology-enhanced working have had on staff in UK HE and FE institutions through:
 - a series of facilitated consultation workshops with key stakeholders;
 - focussed consultancy work to address issues arising from the consultation workshops;
- To develop a series of case studies based in UK HE and FE to illustrate new working practices, their impacts and staff development implications; this will provide a body of evidence on the effect and impact of changing working practices which will help inform future JISC work to support institutions in effectively managing changing roles and responsibilities;
- To provide advice and guidance for the UK HE and FE managers involved in staff development and/or change management, based on a synthesis of workshop and case study findings;
- To develop recommendations for new approaches to staff development strategies that take into account the new skills, competencies and relationships required to exploit the benefits that new technology-enhanced ways of working may provide.

Phase II

Technology is but just one of the PESTLE dimensions – Political, Economic, Social, Technological, Legal and Environmental – which affect institutions and their working practices. The aim of Phase II was therefore to gain an understanding of the broader context of change within which technology constitutes one dimension, eliciting information from wider scenarios (with a broader range of factors and influences) that drive the evolution of working practices and the changing nature of staff roles and responsibilities. Specific Phase II objectives were:

- To undertake desk research to identify key PESTLE factors and influences, and existing work relevant to HE and FE in this area;
- To undertake 1-2 workshops with key stakeholders to explore the impact that political, economic, social, legal and environmental changes can be expected to have on working practices and staff roles and responsibilities across HE and FE;

- To revisit the Work-with-IT case studies to analyse their changing working practices and the impact on staff roles and responsibilities with respect to the PESTLE factors;
- To produce a report on changing staff roles and responsibilities within HE and FE.

Phase III

At the time of commissioning Phase I in early 2008, the use of Web 2.0 technologies within HE and FE was still in its infancy and, as a result, it was too early to analyse the effect of Web 2.0 technologies on the evolution of working practices. By mid 2009, there was significantly more experience within the sector. The aim of Phase III, commissioned in October 2009, was therefore to investigate the effect of Web 2.0 technologies on the evolution of working practices and staff attitudes, and the resulting impact on staff roles and responsibilities across HE and FE. Specific Phase III objectives were

- To undertake desk research to identify existing work relevant to HE and FE in this area;
- To undertake a series of interviews with key stakeholders – projects, institutions and relevant experts to explore (a) the impact that Web 2.0 technologies are having on working practices and staff roles and responsibilities across HE and FE and (b) how this might evolve in the short to medium term;
- To integrate the findings of the research into the overall Work-with-IT report on the evolution of working practices.

1.3 The approach adopted

As the Work-with-IT project was concerned with the impact of technology on staff, the overall methodological approach was based on that of complex socio-technical systems. Such an approach was required because, as discussed in subsection 1.1, change within educational institutions is complex in nature, where the impact of new technology combines with business drivers, culture and environmental factors in a non-linear manner, making the consequences of change potentially unpredictable and difficult to understand or plan for. By examining technology-enhanced changes from a socio-technical perspective, such interdependencies are made more explicit and different potential effects on staff can be examined.

The Work-with-IT project focussed on addressing the three key research questions:

- 1. How has the adoption of new technologies and practices brought about changes within institutional workforces, and how have these changes affected staff attitudes towards their work and also the student experience?*
- 2. How have staff roles, relationships and working practices adapted to accommodate these changes?*
- 3. What new sets of skills are required in order to work in new ways that exploit the benefits (or overcome barriers) afforded by new technology environments?*

The specific approach adopted varied in each phase.

Phase I consisted of four activities. Firstly, desk-based research was undertaken to (i) identify relevant resources and experts pertaining to technology-enhanced working practices and (ii) establish a wide network of contacts who could feed into the project and to whom the results would be disseminated. Web searches, word of mouth recommendations and telephone interviews provided useful background information and genuine insight into personal experiences across the sector. Secondly, workshops and consultation exercises were undertaken to explore the three key research questions. Participants were sought using the network of contacts developed within the orientation phase. Best effort was made to ensure participation across institutional types, roles and geographical coverage, while trying to ensure that key stakeholders and representatives of innovative examples of technology-enhanced working practices attended. Issues that arose were followed up by phone calls or email conversations with relevant individuals. The third activity consisted of ten in-depth case studies designed to draw out current practice and challenges associated with technology-enhanced working from a staff perspective. These case studies focused on the personal stories of individual staff and analysis of the institutional impact of the technology-enhanced changes. The final phase I activity was to develop advice and guidance material from the synthesis of workshop and case study findings. Peer review was used to ensure fitness for purpose.

In Phase II the original ten Work-with-IT case studies were revisited to help explore the non-technological PESTLE factors associated with changing working practices and how these factors might influence the evolution of working practices, staff roles and responsibilities. A two-pronged approach was adopted: (i) investigation of the role that PESTLE factors played in the evolution of innovative working practices within the case studies; and (ii) exploration of how PESTLE factors could potentially influence working practices and roles over the next five years. This was undertaken using a 'scenarios' workshop and a series of semi-structured interviews with the individual case studies.

In the final phase, desk research and a series of activity interviews with key stakeholders – projects, institutions and relevant experts – were conducted to explore the impact that Web 2.0 technologies are having on working practices and staff roles and responsibilities, the skills required to embrace changing working practices; and drivers for uptake of Web 2.0. As Web 2.0 technologies and their use are continuing to evolve, this was followed by an impact analysis which considered the potential uses and future impact of Web 2.0 technologies on HE and FE in the short to medium term.

As the project progressed through its various phases, the overall validity of findings was verified by distributing interim results for comment to participating practitioners and representatives of key stakeholder organisations.

1.4 Scope and content of the report

This report presents the findings from the three phases of the Work-with-IT project to JISC and the HE and FE sectors. In doing so it draws heavily on the workshop findings, in-depth

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case studies, PESTLE investigation, activity reviews and 'Technology-enhanced working: Advice and Guidance for Staff Development and Change Managers' report, all published in detail on the project website <http://www.work-with-it.org.uk>. It is recommended that this more detailed material is also explored as this contains detailed examples and further supporting evidence for our conclusions regarding technology-enhanced changes to working practices and its impact on staff, roles and responsibilities.

This report proceeds as follows. In section 2, current trends in technology-enhanced working practices are examined. The main changes and their implications for staff roles and responsibilities and skills sets are explored. A brief overview of the ten case studies which highlight emerging practices in technology-enhanced working is then presented in section 3. This is followed, in section 4, by a summary of the advice and guidance on the impact of technology-enhanced working on staff and how to support staff experiencing such changes effectively. While this was developed for managers responsible for implementing change or for staff development, it is also of interest to staff affected by technology-enhanced changes to working practices. The potential evolution of technology-enhanced working practices is then explored in section 5. Section 6 then considers the effect that Web 2.0 is having on working practices and associated implications for institutions. The report ends in section 7 by summarising the conclusions drawn from the study, outlining the implications of the findings and highlighting a series of recommendations for new approaches to staff development strategies that take into account the new skills, competencies and relationships required to exploit the benefits that new technology-enhanced ways of working may provide.

2 Exploring technology-enhanced changes to working practices

The extent, pace and complexities associated with technology-enhanced changes to working practices can make understanding both the potential and the impact of such changes difficult. While the Work-with-IT project was primarily concerned with staff, the effect of the new working practices on staff derives not only from the technology itself but also from changing business aims and objectives. The project therefore used a three component framework – staff, technology and business drivers – to explore technology-enhanced changes to working practices from a socio-technical perspective.

The exploration phase consisted of desk-based research followed by two consultative workshops – one in Birmingham, the other in Glasgow, to ensure representative geographical coverage. Each workshop had 18 participants who were selected on the basis of role, institution and involvement with innovative working practices. This ensured a broad but well-focussed data sample. The workshops proved highly popular and successful, with both workshops being oversubscribed. However, difficulty was experienced in encouraging sufficient FE participation in the Birmingham event. As the emphasis of the workshops was on consultation and information gathering, a facilitated open approach was adopted. Further details of the approach used can be found in the workshop report [12].

While a third workshop had been initially anticipated, after discussion with the JISC programme manager, it was agreed that it would be more beneficial to JISC's overall aims and objectives in the field of 'Roles and Responsibilities' if the project team were to participate in two other related JISC projects' workshops to ensure that there was a sharing of emerging findings and a cross-fertilisation of ideas. The first was the 'Roles Workshop' of the JISC-funded 'Roles and Competencies Landscape Study' project [13]. This workshop was concerned with exploring the modelling of roles found in HE. The second workshop was a Scenario Planning Event on 'Future Roles, Responsibilities & Working Practices in the Education Sector' led by JISC Netskills [14]. The main objective of this latter workshop was to explore potential future scenarios and much of the baseline work was based on the findings from the two Work-with-IT consultation workshops.

The desk research and workshops led to the synthesis of a more detailed framework for exploring technology-enhanced changes to working practices which is presented in Figure 1 below.

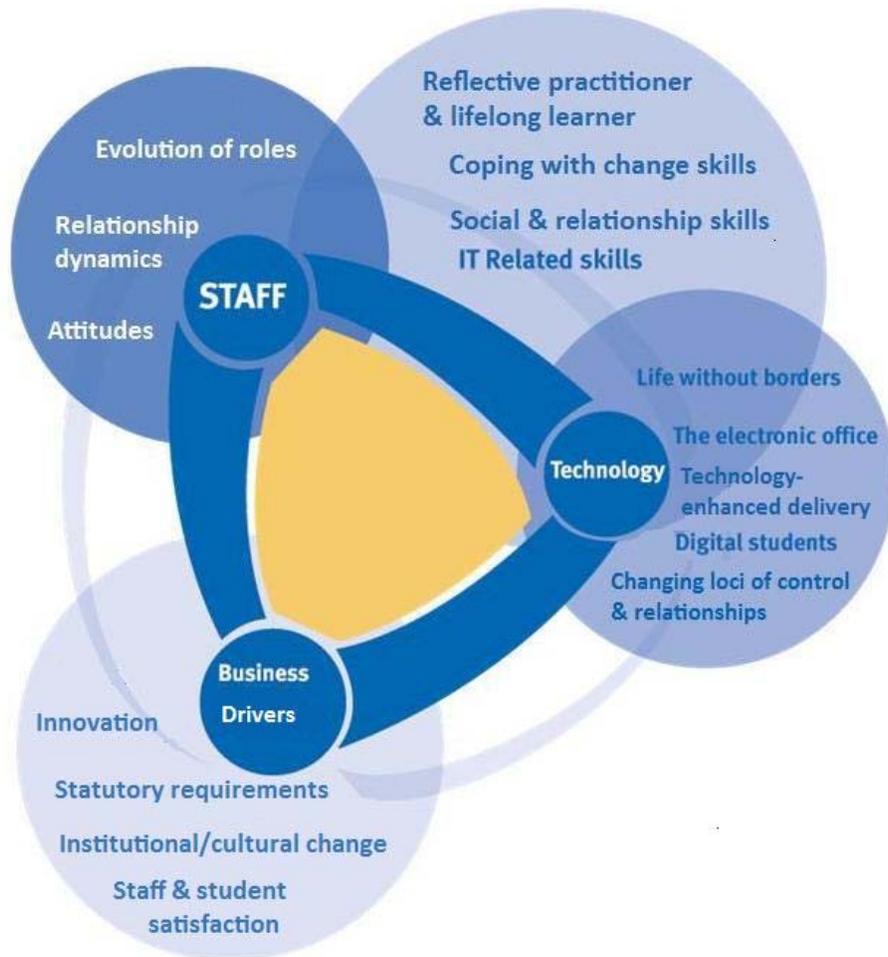


Figure 1: Technology-enhanced changes to working practices framework

The circle to the right captures the key changes to technology-enhanced working practices that were identified. The top left circle represents the direct effects on staff and the top right circle represents the key skills demanded of effective technology-enhanced working. These three large circles then correspond to the three research questions relating to technology-enhanced working identified in section 1. The final large circle to the bottom left represents the business drivers considered in Phase I.

This section then uses the findings of the desk research, consultative workshops and subsequent case studies – see section 3 – to address each of the research questions in turn, expanding on the key features captured in the framework.

2.1 Changes to technology-enhanced working practices

- 1. How has the adoption of new technologies and practices brought about changes within institutional workforces, and how have these changes affected staff attitudes towards their work and also the student experience?*

The overall impression is that technology-driven change is increasingly becoming the norm. This constant change causes concern in three areas. Firstly, if change is ineffectively managed, a long-lasting effect on staff attitudes towards both the particular innovation and technology in general emerges. Secondly, the pace of change is of concern. Thirdly, there is a worry that technology is driving change without proper alignment with strategic business objectives. Two reasons can be identified for this mismatch with strategic business objectives. Firstly, technology may be inappropriately employed by managers to drive change. While as Duke et al's [15] JISC study into the integration of technology into institutional strategies argues that technology can have a transformational role, the concern expressed by participants is that it is employed to drive change without a proper understanding of how this can actually be achieved. This links with Duke et al's findings that lack of technology literacy within the Senior Management Team of an institution leads to a fundamental lack of understanding regarding how technology may be effectively employed to aid transformation or as a strategic enabler. Secondly, the increase in adoption of Web 2.0 technologies is driving change from the bottom-up. Good practice suggests that strategies should be cascaded so that there is an onus on individual staff and departments to ensure that their activities conform to a departmental business strategy, which is strongly aligned with that of the institution. However, such bottom-up approaches may conflict with institutional ICT strategies which have been developed to ensure cost effective core services and minimise duplication. If such problems are to be avoided then one solution might be to follow Duke et al's advice that technology be fully integrated within individual business strategies rather than as a separate ICT strategy. Unfortunately, Duke et al find little evidence that this is happening in academia.

The need to look at technology holistically was highlighted. This does not simply imply adopting an enterprise architecture approach for strategic service developments; rather, how technology developments will affect working practices and staff attitudes and how this might necessitate changes in organisational structure, support and culture all need to be considered from the outset. This suggests that a fundamental review of how institutions view technology and staff is required. This is envisioned as a staff-focused perspective akin to the recent 'changing the student experience' initiatives.

Overall, workshop and case study participants reported a positive attitude to technology-enhanced working practices. As the case study examples below demonstrate there is a strong view that technology is enabling:

Paul Fairburn, Senior Bus. Development Manager, Location Independent Working, Coventry University Enterprises Ltd.

Location independent Working (LIW) has helped Paul to develop new external working relationships. For example, when initially working LIW, he had a base off-site at the NHS in Coventry, which enabled excellent networks to be established as his presence there helped clients develop a relationship of trust. Ultimately this led to the development and securing of research contracts for the University.

Charlotte Roueché, Professor, E-Research, King's College London

"Completely transformed my way of teaching [...] and I think that was transforming the way I was thinking as well."

Louise, Assessor, Enhancing Vocational Training, West Lothian College

Louise is able to utilise her time more effectively and is able to adapt her working practices to the needs of her candidates.

However, scepticism, concern over change itself, changing norms and expectations, frustration relating to the ability of either the technology itself or of the skills required to effectively use it, and increased stress regarding 24x7 contactability were all in evidence. Having an innovation champion in a department or extended team who is prepared to bring new technologies to the attention of staff by embedding them in a project or a business process of immediate concern ('a burning platform') may help reduce scepticism.

Interestingly, almost dichotomous reactions of staff within the same department to technology-driven changes were reported – 'winners and losers', 'enabling and drowning', 'liberating and threatening', 'empowered and coerced'. While this may be down to personal outlook – 'the pot half empty' versus 'the pot half full' – appropriate change management and training could do much to reduce the negative impact. This should take into account the range of staff experience and attitudes, the aim being to help staff feel empowered rather than coerced.

Major technological influences arise from the explosion in communication and information management technologies. Both the extent of technology use – be it locally or remotely hosted – and the amount of variation of technology tools is significant. The resulting changes brought about by the adoption of these technologies can be grouped together under five broad themes illustrated in Figure 1 – *Life without borders, The electronic office, Technology-enhanced delivery, Digital students, Changing loci of control & relationships*. These broad themes and their implications for staff are described below.

(i) Life without borders³

Case Study Examples:

Location Independent Working: Coventry University Enterprises Ltd.

<http://ewds.strath.ac.uk/work-with-it/CaseStudies/LocationIndependentWorking.aspx>

Part-Time Working & Technology: Open University

<http://ewds.strath.ac.uk/work-with-it/CaseStudies/PartTimeWorkingTechnology.aspx>

One of the biggest impacts of new communication technologies is the dissolution of traditional work boundaries – for many, daily working life is no longer restricted to 9-5 office hours or to the physical campus.

The 24x7 communication network is viewed both positively and negatively. On the one hand, it offers more ‘student-focussed’ learning since it enables students to seek help as the need arises and also fits around the reality of students as part-time workers. While this flexibility is clearly advantageous, concerns were raised about its effect on students as independent learners. For example, lecturers report that students simply send an email requesting help rather than first spending time working on the problem themselves. This suggests that further thought needs to be put into pedagogical design to strongly encourage independent learners. For example, the Scottish Funding Council sponsored the REAP project which redesigned a first year psychology course to use a peer scaffolded design where monitored peer feedback supports large student numbers [16].

Academics also report a feeling of being pressurised to respond in real time. This arises not only from perceived student expectations of an ‘instant’ reply, but also, in some instances at least, from a department’s culture as some staff feel they have to be seen to be available out of hours by their peers. Techniques for minimising stress and developing positive and effective cultures will be required.

The encroachment on leisure time is not purely an academic problem. Some professional staff view 24x7 availability positively, enabling them to keep on top of their jobs while others manage such encroachment by not having a PC at home. Being able to establish a comfortable work-life balance is clearly an issue across different categories of staff, but how this is achieved needs to be tuned to individual needs.

Location independent working (LIW) is a more recent trend, which has developed, in part at least, in response to work-life balance issues, with space saving also being a significant driver. Coventry University, the Open University, UHI Millennium Institute and Telford College provide interesting insight in this area, although implementations and experiences vary in each case.

³ Case Study examples are illustrative of these particular trends however many also cut across all of the trends outlined.

Successful LIW initiatives generally tend to provide work areas with a very high specification as an incentive to encourage staff to move from individual offices to 'hot-desking'. While workshop participants reported that these spaces are viewed very positively, further discussion with the Scottish Funding Council-funded 'Effective Spaces for Working in Higher and Further Education' project [17] indicated significant negative feedback from staff in at least one institution. How the home office is financed and supported also varies. This in large measure depends on the size of the organisation. For example, while Coventry University Enterprises Ltd. provides initial off-site support visits, such service approaches simply cannot be scaled to organisations like the OU who employ 8000 part-time tutors working from home. However, this can lead to frustration and a feeling of unfair treatment for the individual members of staff involved.

The extent of LIW varies. Some institutions and organisations allow staff to be on site only for specific meetings or course delivery, while others insist on 2-3 days per week. Interestingly, examples are found across all categories of staff. For example, despite the common perception that administrative staff must be office bound, at Coventry University Enterprises Ltd. some PAs work at home, reportedly without causing dissatisfaction amongst the staff they support. On the other hand, there is anecdotal evidence that administrative staff are not permitted to work from home due to lack of trust. This leads to a significant level of dissatisfaction as the administrative staff involved claim to be more productive at home due to the ability to avoid interruptions to carry out mundane tasks like ad hoc photocopying for academics.

While staff generally report an improved work-life balance, a perceived increased pressure to respond immediately is often felt, as staff do not want those in the office to think they are 'slacking'. However, as the case study vignettes illustrate this disappears over time as staff on campus and at home become more comfortable with the working practice. Better initial management of the introduction of working from home to bring everyone on board could minimise the period of adjustment. Training on appropriate tools and working practices will also help reduce the misuse of email and will empower people to have the confidence to act independently. It is also suggested that the lack of instant access to others leads to better time management and encourages reflective practice.

(ii) The electronic office

Case Study Examples:

Paperless Admissions: Coventry University

<http://ewds.strath.ac.uk/work-with-it/CaseStudies/PaperlessAdmissions.aspx>

Regional Management Information Systems: North West Regional College

<http://ewds.strath.ac.uk/work-with-it/CaseStudies/RegionalManagementInformationSystems.aspx>

Technology has completely changed the way traditional 'office' functions are carried out. To a large extent much of the traditional role of office administration has disappeared, with

individual members of staff responsible for their own letter writing, photocopying, meeting scheduling and student administration. This has led to a reduction in traditional central administrative staff roles and a realignment of duties within departments where administrative staff are asked to take on more complex tasks as more basic administrative functions are carried out by managers and academics.

While the freedom from reliance on others could be viewed as liberating and enabling personal control, in general, administrative, academic and professional staff do not view this change in a positive light. For academic and professional staff self-service administration is viewed as an intrusion, increasing time pressure and information overload. While better time and information management skills could go some way to addressing this, there is still a fundamental issue as to whether some of the redistributed administrative tasks makes for efficient use of academic and professional staff's time. There is also a worry concerning duplication of effort, with departmental and central administrative staff potentially carrying out similar tasks.

For administrative staff, these changes are equally problematic as they increase tension with other staff. For example, administrative staff may be viewed as unhelpful when they try to implement departmental policies of self-service administration. The changes also lead to a feeling by some that administrative jobs are at risk and create a worry about reallocation of duties and changes in roles. For example, administrative staff are being asked to move out of their comfort zone, taking on new tasks which often require up-skilling. Even where training support is provided, up-skilling as opposed to re-skilling is in some cases viewed as too pressurised while in other cases it is seen as a welcome opportunity. These changes in working practices are often not formalised, leading to uncertainty of the value of a role or of the tasks involved.

There appears to be evidence that a counter-trend is emerging, moving student administration tasks back to administrative staff.

The 'paperless' office is another significant technology-driven change. At its most basic this constitutes electronic memos and online service requests. While this has been advocated for several years within the academic sector and in business, whether it has actually been achieved is debatable. For example, some staff print out their emails before reading. So while technology has provided a means to change working practice, this may still be circumvented by some users, preferring to maintain old ways of working. Staff Intranets are a key development in the paperless office movement. The availability of online resources enables a more flexible, distributed workforce. However the ease of access and update of electronically available information has reduced shelf-life, illustrating the dangers involved in retaining pre-technology working practices such as use of paper copies.

More significantly, some institutions have taken strategic decisions to fully digitalise key business processes. Coventry University's Paperless Admissions system is a good example. In this case, the radical administration changes have been viewed very positively, rather than as a threat, by administration staff. Coventry believe this is due to the automation of more repetitive tasks, freeing up staff to engage in more demanding and interesting practices – in Coventry's case student recruitment. Key to the success of both the project

and contented staff has been the inclusion of appropriate staff development and motivation from the outset.

The Coventry case sparked an interesting discussion regarding the ethics of fully automated admissions and the extent to which there should be human involvement in the decision process relating to applicants' education opportunities. In this case, whilst many traditionally manual clerical/admin activities (e.g. sorting forms into categories) have been automated, Coventry still feels that it is important to have a human-being assess applications and make final decisions.

Information overload is also a significant issue, leading to staff feeling pressurised.

This delegation of basic IT functions to individual desktops is having a knock-on effect on IT professionals, who may feel devalued as other staff become more "enabled" or "digitally fluent". An increased expectation upon staff to respond promptly to user needs and requests and to explain their decisions is leading to a pressurised feeling which is compounded by a worry that in time they will no longer be seen as "specialists".

(iii) Technology Enhanced Delivery

Case Study Examples:

e-Research, King's College London

<http://ewds.strath.ac.uk/work-with-it/CaseStudies/EResearch.aspx>

On-line course delivery in a dispersed environment, UHI Millennium Institute

<http://ewds.strath.ac.uk/work-with-it/CaseStudies/OnlineCourseDeliveryinaDisperseEnvironment.aspx>

In recent years technology has had significant impact on how learning is delivered and supported.

A new push towards technology-enhanced learning is in evidence. Despite the rhetoric regarding pedagogy-led as opposed to technology-led learning, there is disquiet regarding the expectation that VLEs or other innovative technology be used. Even in older institutions such as the Universities of Manchester and Edinburgh, which have previously marketed themselves through academic reputation, technology-based delivery is now seen as essential to competing effectively for the student market. These strategic moves often result in a tension between centralised and decentralised provision and support.

Strategies, it was suggested, often do not keep abreast of technological implementations causing much frustration. For example, strategies may emphasise research to the apparent detriment of technology-enhanced learning. And while the use of a VLE is often viewed as almost compulsory, staff are still assessed on old measures such as face-to-face contact hours. Academics also feel frustrated and under-valued that management does not

recognise the increased time needed to develop online learning. Similarly, there is a feeling that research is often valued more than technology-enhanced learning innovation.

That said, academics in general feel very positive and enthusiastic about the benefits technology brings to the student learning experience. For example, technology can enable team- and problem-based learning, provide high quality resources from a global repository and actively engage students. Thus, technology may be viewed as a tool for improving the value of teaching and learning and as a means of raising the professionalism of 'teaching'.

Global information availability has radically changed library services. A reduction in demand for traditional librarian information-seeking skills has led to a feeling of down-skilling. On the other hand, many librarians are extending their skills and are now actively involved in teaching information skills within the classroom. As discussed in section 1, anecdotal evidence suggests that this, on occasion, extends to the provision of pastoral care and acting as a trusted intermediary between student and academic.

Global information availability has also reduced the need to visit the library. However, adaptation of library spaces such as the Saltire Centre at Glasgow Caledonian University to act as a one-stop shop for students which combines services with noisy team-working and extensive PC provision has led to a reversal of the trend. Additionally, emerging services where the library delivers high quality information resources directly to the desktop through either VLEs or specialised search engines are viewed as exciting opportunities to improve the quality of learning materials by both academics and librarians alike.

Poor change management is at the heart of many technology issues. For example, the perceived institutional management tactic of using technology to drive change⁴ is questioned by some staff. At best, this negative perception illustrates a failure to fully convey the benefits of the change to staff. Badly planned technological roll-outs are particularly problematic. They not only affect the business process they are designed to support, but have a knock-on effect on other technology roll-outs as staff lose confidence in technology or in their institution's ability to implement it effectively. These negative associations with technology become entrenched and may be very difficult to disperse. Workshop participants felt that academia could learn much from the business world's more rigorous stakeholder consultation and product-testing regimes.

The Digital Fluency programme at Sheffield Hallam University (see case studies) is attempting to develop a greater partnership in managing technological change using task teams made up of representatives from all areas of the university. In this programme staff are encouraged to share their experiences and to work together in task teams to achieve a greater understanding of the effects of strategic technological decisions on staff and students.

Even apparently successful implementations still leave staff with a feeling of being exposed to risk when the services they support are time-critical. Academics in particular worry about

⁴ For example, technology-based solutions may be introduced to ensure compliance with financial auditing requirements adding extra tasks to existing working practices.

using technology to deliver teaching. There is a general feeling that the risk is reducing as more integrated technological solutions are being fitted into lecture theatres and classrooms. However, when things do go wrong, there is often inadequate real time back-up from central IT services.

Rapid technological change as opposed to specific technological solutions was identified as the new norm. This makes effective change management and the development of flexibility and a lifelong learning ethos for staff as well as students all the more important. The idea of embedding specific technologies is questioned as this may lead to structure and strategy 'freezing'. A strategy of encouraging exploration of technology rather than embedding specific technologies might offer a better way forward.

(iv) Digital students

Case Study Examples:

E-Mentors: Leveraging Digital Native Students: Oaklands College

<http://ewds.strath.ac.uk/work-with-it/CaseStudies/EMentorsDigitalNativeStudents.aspx>

Enhancing Vocational Training at Work: West Lothian College

<http://ewds.strath.ac.uk/work-with-it/CaseStudies/EnhancingVocationalTrainingatWork.aspx>

The arrival of 'digital' students is also viewed as a major factor in technology-driven change. While there is a feeling that some institutional staff may be 'digital immigrants' as opposed to 'digital natives', it is important to emphasise staff pedagogic skills and professionalism. While digital students may be highly competent with technology, they are not necessarily competent independent learners and therefore there is still much traditional pedagogical work to be done. It was felt that emphasising the importance of pedagogical skills is a way of boosting staff who perhaps feel exposed as a result of less familiarity with rapidly changing digital technology.

It was also stressed that competency does not equate to good practice. To become effective learners, students need to be supported in overcoming bad habits such as a reliance on unsubstantiated information or poor netiquette. The lack of critical information retrieval skills is particularly problematic and needs to be addressed. Embedding the development of information literacy within subject teaching or practical work is therefore recommended.

Prevailing assumptions about student expectations were also challenged. Despite their apparent reliance on technology in their everyday lives, students are still keen to retain face-to-face links with academics. Whether personal online support or face-to-face contact is required is queried. For example, the Open University is tackling this need by creating personal online support spaces for students.

There is evidence to show that prospective students are using social networks to find out what a particular university is like before deciding which course/institution to study at. So,

while it is suggested that student expectations of technology-enhanced learning should be better capitalised upon, it will be impossible to fully control information flows.

(v) Changing loci of control and relationships

Case Study Example:

Knowledge Exchange across Rural Borders: National Rural Knowledge Exchange
<http://ewds.strath.ac.uk/work-with-it/CaseStudies/KnowledgeExchangeacrossruralborders.aspx>

Digital fluency: Sheffield Hallam University
<http://ewds.strath.ac.uk/work-with-it/CaseStudies/DigitalFluency.aspx>

‘Changing loci of relationships and control’ captures the move away from traditional working relationships to one of collaboration and individually-led innovation.

Technology has also greatly increased the opportunity for collaboration. Within the research arena this is viewed as highly positive, enabling academics to connect with fellow researchers and data around the world. Key to this attitude is the absence of a feeling of coercion that often exists within teaching and learning. Technology is viewed as relieving pressure rather than adding to it.

Technology is also increasing the ability to collaborate externally in other areas. The ‘National Rural Knowledge Exchange’ is a collaboration of 14 universities and colleges which would not have been achievable without technology. Here, technology offers new and innovative opportunities for a radically new way of working. For example, social networking tools offer the potential for business intelligence and knowledge exchange. However innovative use is often restricted by academics’ perception that it is at odds with the traditional ethos for ‘scholarly communication’. The physical isolation in such consortia also presents team building and collegiality difficulties as well as problems providing effective technical support.

Further use of such technologies is moving from a simple dissemination or limited communication tool to a more social and participatory phase where staff and students can adopt new technology-enhanced working practices without recourse to traditional institutional infrastructures or service provision. For example, Web 2.0 facilities such as YouTube for content sharing or online social networks are increasingly being used, by academics and students alike, to support learning. As the Knowledge Exchange Across Regional Borders case study illustrates, such technologies are also being used to build knowledge-sharing Communities of Practice which cut across traditional institutional boundaries.

These facilities are generally provided by external organisations and are therefore outside institutional support structures. As the JISC-funded study of the Use of Web 2.0 technologies

for content creation for learning and teaching in Higher Education [18] highlights, such services offer the opportunity to catalyse change, enabling greater student independence, encouraging collaboration and offering new methods of delivery of social constructivist based learning. However, there are significant implications for ownership of material, preservation, teaching and assessment methods, support and skills needs and training.

Further, the new digital environments created by Web 2.0 have blurred the boundaries between core literacies; information literacy, IT competencies, online interaction skills and critical thinking ability which underpin the academic experience. We therefore need to develop an approach that helps staff and students make sense of this complexity. Traditional ways of organising the agencies that have supported the development of these literacies become less useful. The Digital Fluency Initiative at Sheffield Hallam University is creating opportunities for librarians, IT specialists, learning technologists and student support advisers to work in new collaborative teams to produce new learning resources, support and consultancy services.

Technology is also viewed as a potential enabler for the redesign of working teams based on functional services. This is happening to some degree within administrative functions. However the potential for redesign of academic teams to encourage collaboration between academics, learning technologists, learning support and administration is suggested as a way of spanning silos and improving services – teaching and learning in this case.

2.2 Changing roles and relationships

2. *How have staff roles, relationships and working practices adapted to accommodate these changes?*

a) **Evolution of Roles**

Both integration and differentiation of staff roles and relationships are in evidence.

Hybrid roles which span traditional job functions are emerging - learning technologists, community of practice facilitators, digital librarians, repository managers and e-Researchers being prime examples. The most immediately recognisable is that of the learning technologist, which spans the gap between pedagogical and IT experts. Within collaborative working, intermediaries or facilitators are hybrid roles increasingly assigned to connect staff with differing skill sets or at remote locations.

The hybrid role is potentially an area of significant expansion. Excellent communication skills as well as an understanding of the various specialisms that the hybrid role spans are critical for success.

The e-Research case study, based at King's College London provides useful background and insight into the evolution and impact of hybrid roles. Here, the newness of such roles present clear career development challenges:

Torsten Reimer, Development Manager, E-Research, King's College London

The shift in emphasis from historical research to ICT in Torsten's career development has also reduced pressures. While still mainly a historian, Torsten was expected to actually fill both the roles of the historical researcher and the digital humanities developer. While other PhD students were employed for projects that were at least related to their historical research, Torsten had to balance two sometimes very different activities. While he could have pursued a PhD focussed on digital research, he did not yet want to give up more conventional historical research. Torsten also felt that demonstrating the skills of a historical researcher through his PhD was important in a context that did not yet accept e-Research as on a par with 'real academic research'. Luckily, this situation is changing and Torsten welcomes an increasing acceptance of Digital Humanities and e-Research in academia.

Local experts, on the other hand, have much more informal roles which emerge as a result of individual capabilities and circumstances. Such roles may come to be expected and relied upon, often through an unwritten psychological contract. This may lead to a mismatch between official job specifications, performance monitoring and everyday practice. The Paperless Admissions case study at Coventry University demonstrates this informal evolution of roles:

Kully Johal, Recruitment & Admission's Co-ordinator, Paperless Admissions, Coventry University

As Kully's role has evolved she explains that expectations on her have also evolved, particularly in the sense that BES admissions staff have, to some degree, come to depend on her as the "font of all knowledge" regarding the new system.

Perceived role 'slippage', where the tasks traditionally associated with one role have now moved along the process chain, is also identified as a significant issue - academics taking on student administration responsibilities is a prime example - although the slippage may be bidirectional, as evidenced by administration staff taking on a plagiarism detection role. This slippage is also very much in evidence in institutional libraries where librarians report becoming increasingly involved not only in classroom delivery of IT skills but also in pastoral care and academic related advice.

The role slippage is very much driven by technological capabilities rather than holistic analysis of the long term effects on business processes and services. Investigation of what level of slippage is appropriate in a given context is required.

Concern was expressed regarding whether institutional structures and strategies were changing in tandem with the changing roles.

b) Relationship dynamics

Two trends in collaboration can be identified. The first is **collaborative teams**, where different roles come together to deliver a specific business function – the academic team of academic, learning technologist, teaching assistant and administrator being a prime example. The Digital Fluency and e-Mentor’s case studies provide examples of this:

Juliun Ryan, e-Learning Support Adviser, Digital Fluency, Sheffield Hallam University

As an E-learning Support Adviser, Juliun Ryan’s role focuses upon the development and support of technology enabled learning[...] His role facilitates support for all those working or studying within this community, but he predominantly finds himself collaborating with academic staff to offer innovative learning opportunities for diverse cohorts of learners.

Mark Dawe, College Principal, eMentor’s, Oaklands College

“One of the more innovative initiatives that has really grown and developed is the eMentor system. eMentors are learners with the appropriate skills and confidence to proactively work with their tutors to develop and enhance the use of eLearning. We realised that we had a fantastic resource in our student cohort (there are over 3,000 16 to 18 year olds) and many of them have the knowledge and understanding of what technology can do and what they want in a learning environment. This program is successful because of widespread support from the tutors who allowed their eMentor to share the responsibility of managing the IT and contributing to the eLearning for the class. This approach to learning has widespread benefits as the tutors and learners are involved in a more collaborative construction of the learning which fosters a deeper understanding of the work as topics are discussed and explored by students who are active participants in their learning.”

The second relationship trend is **Communities of Practice** where individual practitioners with a common area of interest come together for mutual support and problem-solving. The communities are informal and organic as opposed to more formal collaborative teams.

Negative relationship dynamics can also emerge. For example, **technical silos** may develop where staff are unable to access the technological support they require. For example, workshop participants reported being passed from place to place when trying to get help with a particular piece of technology, putting considerable stress on the relations with technical support staff. The idea of a one-stop shop for staff technical support could alleviate some of the tension. Additionally, a tension between formal and informal support structures and systems in general was also perceived to be an issue as the example below from the Knowledge Exchange case study shows:

Fiona, Manager, Women in Rural Enterprise (WiRE), Knowledge Exchange, National Rural

“...technology is a great enabler of small rural businesses and women are great networkers, the two go very well together, just slightly hampered by money, capacity and experience.....Anything major, it’s really hard because [the network providers] control everything. You can’t add a new printer because it’s on the network. We can’t merge with Groupwise until they tell us we can....”

These negative power dynamics illustrate the tension between formal and informal support structures.

2.3 Skills requirements

3. *What new sets of skills are required in order to work in new ways that exploit the benefits (or overcome barriers) afforded by new technology environments?*

As the case studies clearly illustrate, new working practices demand new skills sets. Four groups of skill sets were identified as essential for staff and senior management if institutions are to work in new ways that exploit the benefits afforded by new technologies. These are briefly summarised below. For further information on the skills and how their development might best be supported see the Work-with-IT Advice and Guidance Documentation [19].

(i) Coping with change

The ability of staff to cope with change, on the one hand, and of middle and senior management to successfully implement change on the other is viewed as critical. This should include, but not be limited to: adaptability and flexibility, lifelong learning, project management and change management. It is also felt that line managers could inadvertently act as a barrier by failing to build in training and exploration time for staff. Thus additional team management skills and checks to ensure that they are applied in practice are required.

(ii) Social and relationship skills

Technology-enhanced working brings together different groups of people in an artificial world where common social signals are missing. Staff working in such an environment need enhanced relationship skills for the virtual world. Difficulties in bonding in cross-functional and often virtual teams are a particular issue. Additionally, staff need support to develop appropriate skills such as empathy and motivation. Team building exercises are also recommended.

The blurring of professional and personal digital presence also requires that traditional professional and netiquette skills be extended to all aspects of digital interaction and that staff are aware of the potential reach and persistence of blogs and other participatory forms

of technology and how personal posts may be deemed professionally damaging. Constant online connectivity means that staff need strategies to set and reinforce boundaries if they are to work effectively without unnecessary interruption or guilt – digital assertiveness skills to manage the trend towards 'life without boundaries' are required.

(iii) Learning Skills

Skills to help staff become reflective and innovative practitioners are also required. These are precisely the skills that academics strive to embed in their students - reflection, critical thinking and the ability to think outside the box within a constructivist framework.

(iv) IT Related skills

Basic 'hard' IT skills such as proficiency with desktop applications are increasingly viewed as essential. Information management skills are also required if staff and students are to make effective use of the vast array of information resources available.

Softer IT-related skills are also required. For example, staff require to be equipped with skills to facilitate the management of an online presence using multiple tools. Further, staff need to be able to optimise the use of technology if institutions are to capitalise on the opportunities offered by technology-enhanced working. This does not mean that all staff need to become technology experts; rather they need to be sufficiently IT literate to make informed decisions and to hold useful discussions with technology experts. Knowing when to involve experts, where relevant expertise can be found and how to effectively communicate with technology specialists and subject or business specialists is key. 'Soft' IT-related skills and competencies such as technology confidence and a willingness to innovate are also increasingly required.

3 The Phase I Case Studies

The aim of the case studies was to cover a range of impacts and effects that new technology has had on the workforce, highlighting effective methods or barriers to their exploitation in furthering institutional goals. Where relevant, the impact of the changing working practices upon the student experience was also covered, although as directed by JISC, the major focus was on the impact on staff and institutions.

To achieve this, a series of ten case studies was commissioned. The case studies were conducted by the institutions themselves with support and guidance from the Work-with-IT project team. The ten cases were selected from innovative or exemplar practices, identified via the workshops, consultation and orientation phases. As illustrated in Table 1, the ten case studies were selected based on innovative technology-enhanced working practice, geographical spread, FE-HE spread and role coverage. As the table illustrates, each case study concentrates on an in-depth study of one, or at most two, technology-enhanced changes in working practice.

Case study	Institution	Technology-enhanced working practice trend	Institution type	Roles	Location
Digital fluency	Sheffield Hallam University	Technology enhanced delivery, Changing loci of control and relationships	HE-post92	Academics, librarians, IT support, professional development, management	England
eMentors: Leveraging digital native students	Oaklands College	Technology enhanced delivery, Digital Students	FE	Academics, students	England
Enhancing vocational training at work	West Lothian College	Technology enhanced delivery, Digital Students	FE	Tutors	Scotland
e-Research	King's College	Collaboration	HE-pre92	Researcher, IT support, librarians	England
Knowledge exchange across rural borders	National Rural Knowledge Exchange Consortium	Collaboration, Life without borders	FE, HE-pre92, HE-post92 (12)	Academics, knowledge transfer professionals, IT support	England

Case study	Institution	Technology-enhanced working practice trend	Institution type	Roles	Location
Location independent working	Coventry University Enterprises Ltd. ⁵	Life without borders	HE-post92	Administrative staff, professional practitioners (e.g. Business Development staff)	England
Online course delivery in a dispersed environment	UHI, associated colleges	Life without borders, Technology enhanced delivery, Digital Students	HE-post92, FE	Academics, librarians, IT support, management, students	Scotland
Paperless admission	Coventry University	Electronic Office, Technology enhanced delivery, Digital Students	HE-post92	Administration, students	England
Part-time working and technology	Open University	Life without borders, Technology enhanced delivery, Digital Students	HE-pre92	Academics, librarians, IT support, professional development, management	UK-wide
Unified administration systems	North West Regional College	Electronic Office	FE	Administrators, managers, finance	N. Ireland

Table 1: Case study selection

Case study participants signed participation agreements specifying required outputs and timescales (2-4 months) and identifying an institutional case study manager holding overall responsibility for delivery of the case study. Various check points or mini-deliverables such as delivery of a sample vignette early in the case study processes were also set.

The overall case study design was based on Yin [20]. The case studies were exploratory in nature, designed to draw out current practice and challenges associated with technology-enhanced working from a staff perspective. As advocated by Yin, the case studies were carried out using a case study protocol. The protocol had three phases each designed to gather different information regarding the technology-enhanced change to working practices. These are briefly summarised below. See the case study protocol (Appendix A) for further details.

⁵ Coventry University Enterprises Ltd is the commercial arm of Coventry University.

- (i) The overall technology-enhanced change in working practices was captured. This was achieved by drawing on soft systems methodology [21]⁶, which suggests three strands of interrelated analysis of the systems under investigation – the technology system⁷, the social system and the political system. As Figure 2 below illustrates, these analyses examined both the working practice and the change process.

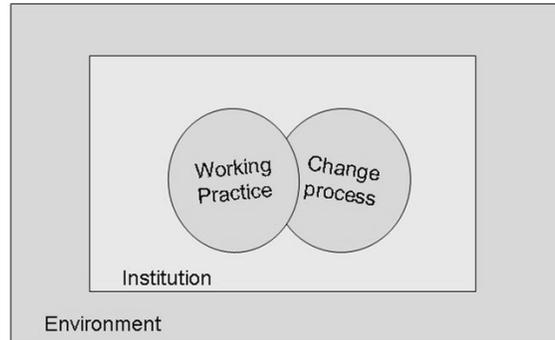


Figure 2: The processes being investigated

- (ii) 4-6 personal vignettes were developed which captured, from an individual's perspective, how technology change has impacted on the working practice under investigation, the individual's attitude to the change and arising issues, how in their opinion it has indirectly affected either the student experience or other staff/services, and how they expect their role to change in the future. This was achieved using a semi-structured interview technique.

By choosing a practitioner accounts approach, this allowed both the power of the narrative to be exploited when conveying findings to peer groups and other stakeholders, while also providing a range of scenarios which could be used as a basis for future exploration and identification of advice and guidance requirements. A student-focussed narrative was also developed where appropriate.

- (iii) An impact analysis was carried out to:
- Evaluate the overall effect on the workforce of new technology environments;
 - Provide an overview of its staff development policy and roles;
 - Evaluate the effectiveness of this policy in addressing the issues arising from technology-enhanced changes in working practices, identifying where gaps need to be addressed.

This was achieved through brainstorming sessions with stakeholders, drawing on the MIT90s Framework [22], illustrated in Figure 3 below, which provides a useful framework for discussing the factors that influence organisational change. Using this framework,

⁶ Checkland's [21] Soft Systems Methodology (SSM) was not adopted in full as it is primarily concerned with problem solving; however, much use was made of strategies within it.

⁷ Known as the purposeful system in SSM.

institutions were asked to consider a series of probing questions designed to tease out indicators of effectiveness for comparison against the institution's own aspirations.

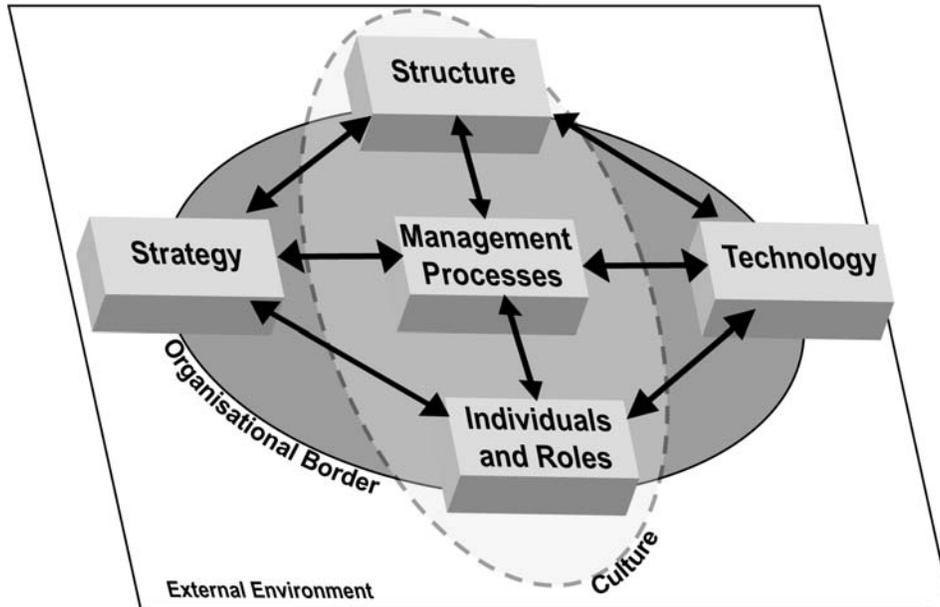


Figure 3: Representation of Scott-Morton's MIT90s Framework

Each case study was presented with a case study protocol to guide the development of case study material and analysis. Feedback reported that participants found this protocol extremely useful. Each study officially began with a site visit by a member of the Work-with-IT project team to ensure that the purpose, methods and deliverables of the case study were clearly understood and to help those institutional case study managers who were less experienced in research.

The site visit and ongoing contact was reported as extremely helpful. In particular, the feedback the institutional case study managers received on initial draft vignettes was reported as highly useful. The most significant difficulty experienced was the scheduling of the case studies during the summer break.

The ten case studies each produced rich and extensive resources relating to individual staff experiences and institutional impact of technology-enhanced working practices. Brief introductions to the ten case studies are presented below. However readers are directed to the Work-with-IT project website for full details.

3.1 Digital Fluency – Sheffield Hallam University

The Digital Fluency Initiative was commissioned by the University Executive in 2007. The aim of this initiative is to raise the profile of digital fluency, to embed it as a core graduate attribute and a key element of professional development for all staff. Put simply, digital fluency at Sheffield Hallam University is characterised by the necessity to 'live learn and work in the digital age'. Digital technologies permeate every aspect of our lives and have a

profound effect on how individuals and organisations communicate. This means that 'those who can understand and comfortably use e-facilities are significantly advantaged' [23]. Although many staff at Sheffield Hallam are becoming more confident users of digital technologies, as are its students, there are differing levels of confidence and need. The ability of staff to confidently engage with digital technology has a significant impact on student engagement [24]. In this context, the challenge of supporting staff to build their digital capabilities is critical. *'If further and higher education institutions are to continue to successfully deliver their core business, staff i-skills have to become a fundamental feature of all staff development policies'*. It is key that decisions about the future direction of the University and its responsiveness to changing external agendas and opportunities can be made on the basis that staff skills will not present a barrier to progress.

This Work-with-IT case study focussed on the new communities of practice that were developed to support digital fluency – an institutional community of practice to develop the strategic approaches necessary to deliver the agenda and operational communities of practice at delivery level - which have come together to develop a range of interventions including university wide staff development fairs, new student mentoring models for digital fluency, faculty based digital fluency staff development programmes. Five staff were involved with this initiative: information advisor, e-learning support advisor, IT manager, executive dean and programme leader.

Further details of these staff members' experiences and the analysis of the impact of new technological environments on the workforce can be found at <http://www.work-with-it.org.uk/CaseStudies/DigitalFluency.aspx>.

3.2 eMentors – Oaklands College

The introduction of Student eMentors to facilitate staff training and an enhanced use of technology in Oaklands College has been the focus of a concentrated enculturation process over the last two years. The eMentors scheme joins the pedagogical viewpoint of the teacher with the pragmatic approach and technical ability of the student. Using the students to support teachers in utilising technology appropriately in the classroom or workplace, the eMentors support the staff using technology by mentoring them with methods and techniques that the students themselves take for granted. Based on the concept that the one in the household who knows how to use the DVD properly is the child –Oaklands' eMentor students can be called on to help with everything from assisting lecturers with equipment such as laptops, projectors and electronic whiteboards, to encouraging fellow students to make use of the college's VLE and the reporting IT faults to the Helpdesk.

This Work-with-IT case study focussed on both staff and student experiences of the eMentoring system and will outline the strategy for developing learning spaces within a new, intelligent building to further enable and embed the process. This includes perspectives from the college principal, director of e-Learning, IT manager, two tutors and two student e-Mentors.

Further details of these staff and students' experiences and the analysis of the impact of new technological environments on the workforce can be found at <http://www.work-with-it.org.uk/CaseStudies/EMentorsDigitalNativeStudents.aspx>.

3.3 Enhanced Vocational Training at Work – West Lothian College

West Lothian College is pioneering a new online software package to make training and professional development more accessible for small to medium enterprises (SMEs). The E-learning portfolio, which has been singled out by HMIE inspectors as 'sector leading and innovative practice', uses specially developed software to deliver online training, across a range of qualifications and subject areas. It allows students 24-hour access to submit coursework, and removes the need for staff to leave the workplace for training. The portfolio was developed in direct response to research that showed just how difficult it is for staff working for SMEs, particularly at manager level, to find the time to leave the office and attend professional training. It offers a flexible alternative to the traditional model of training and development, giving students the chance to fit studying around other commitments and study at a pace that suits them.

This Work-with-IT case study explored the use of e-portfolios to support flexible vocational learning within the Lothians. As a result of the transition to e-portfolios the Vocational Assessors have increased their levels of course delivery whilst providing a higher standard of course quality in learning and teaching. The case study focuses on the experience of five work-based assessors/verifiers with varying degrees of experience plus a vocational training student.

Further details of these staff and student's experiences and the analysis of the impact of new technological environments on the workforce can be found at <http://www.work-with-it.org.uk/CaseStudies/EnhancingVocationalTrainingatWork.aspx>.

3.4 e-Research – King's College London

Over the last decades, Information and Communication Technologies (ICT) have slowly made their way into research and teaching in the arts and humanities. Word processing and email are now standard tools of academic staff in all disciplines. New working practices include the use of online library catalogues, databases, document delivery services and access to digitised sources. Researchers and students also use various communication and collaboration tools such as instant messaging, wikis, blogs and e-learning platforms. While this may be seen as a fairly advanced use of technology by some, others go even further and incorporate digital methods in their daily research practice: creating digital editions of early modern documents, using geo-spatial information for 3d-visualisation of ancient sites or making high speed networks accessible for performing arts. The buzzword e-Science is used to propagate the use of high performance computing and shared access to digital resources; also, new disciplines such as Digital Humanities or e-Research have emerged. This has led to a situation in which some see ICT merely as a convenient tool for access to information while others have completely changed their working practices.

This case study looks at the impact ICT has had on arts and humanities researchers and students and also on those who provide them with access to digital tools and data. At King's

College London, both the Centre for Computing in the Humanities and the Centre for e-Research host a variety of digital projects and engage with partners within other departments of King's as well as with an international audience for which they provide advice, tools and materials. The case study focuses on the experience of six staff and students involved in e-Research: a humanities information specialist, a research associate a PhD student, a development manager, a professor and a chief editorial assistant.

Further details of these staff and student's experiences and the analysis of the impact of new technological environments on the workforce can be found at <http://www.work-with-it.org.uk/CaseStudies/EResearch.aspx>.

3.5 Location Independent Working (LIW) – Coventry University Enterprises Ltd.

LIW in Coventry University Enterprises (CUE) offers their employees an opportunity to work from an alternative location than the office, including the ability to work from home, and reduce occupancy of the Innovation Centre. As such the process of technological change has facilitated a change in working practices. The main objectives of introducing LIW are to:

- allow employees the flexibility of working hours and location, thus improving their work life balance;
- raise income generation in terms of profitability and facilitate CUE to deliver its primary aim of generating income for the Group;
- assist employees in meeting customer needs if their requirements are outside “standard” working hours;
- become a more attractive employer.

This case study looks at the impact that technology-enhanced location independent working ICT has had on staff within CUE. Five practitioner vignettes, providing detailed personal accounts of the experience of adopting LIW within Coventry University Enterprises Ltd at Coventry University. Testimonies come from both different job roles within CUE and in terms of individuals' seniority within the institution. The individuals selected were chosen to provide a range of perspectives on the effectiveness of these new ways of working across CUE. Thus the vignettes include: a Senior Business Development Manager, a Personal Assistant, a Senior Project Manager, an Assistant Director, and a Finance Support Officer.

Further details of these staff's experiences and the analysis of the impact of new technological environments on the workforce can be found at <http://www.work-with-it.org.uk/CaseStudies/LocationIndependentWorking.aspx>.

3.6 Online Course Delivery in a Disperse Environment – UHI Millennium Institute

The BA in Child and Youth Studies (BACYS) was the first UHI degree designed specifically for full on line delivery and is the template on which subsequent degree developments have been based. The degree has now been running for several years and student numbers have reached just over 300 across the four years of study, with students living in a very wide geographic area within and beyond the Highlands and Islands. The BACYS degree is however by no means considered as ‘the finished article’ and is constantly changing in

response to student feedback, course team self evaluations and the changes within UHI. The challenges of delivering and managing a networked programme are a core part of the enhancements ongoing. Whether this is systems, administration, module development, learning, teaching and assessment strategy, or emerging opportunities for enhancement through new IT developments, the focus remains on ensuring a high quality student centred learning experience which is accessible to students regardless of physical location.

This Work-with-IT case study provided an opportunity to take a snapshot of reflections offered by a cross section of those involved with the programme, and to provide a source for internal institutional reflection as well as contributing to the wider academic community discussion and debate. The contributors to this case study report were selected as they all have an important part to play in the understanding of how the use of IT has impacted on working practices. These were a curriculum director/course leader, a course developer/lecturer, a lecturer/student adviser, a learning technologies centre manager/librarian and a student on the course. Their vignettes provide an excellent insight into the common themes and differences in experience of participating in the BACYS degree in some way.

Further details of these experiences and the analysis of the impact of new technological environments on the workforce can be found at <http://www.work-with-it.org.uk/CaseStudies/OnlineCourseDeliveryinaDisperseEnvironment.aspx>.

3.7 Paperless Admissions – Coventry University

The need to improve the time taken to respond to applicants and to remove the dependency on physical paper copies of the application form drove the design and development of the 'paperless admissions processing' project at Coventry University. The ultimate aim would be to increase the conversion rate of applicants to students through an improved admissions process experience by increasing response times and utilising Customer Relationship Management (CRM) functionality to support the student as they move through the application cycle. The project was also part-driven externally by the requirement to move to a completely electronic process in line with UCAS, who from 2006 onwards began reducing hardcopy information, advice and letters to both students and HEI's.

This Work-with-IT case study focussed on detailed personal accounts of the implementation of the new paperless admissions system at Coventry University from five practitioners involved: deputy director Recruitments and Admissions Office (RAO), RAO officer, RAO Co-ordinator and a senior clerical assistant. Their testimonies provide a broad range of perspectives, both in terms of different job roles within the admissions team and in terms of individuals' seniority within the institution.

Further details of these experiences and the analysis of the impact of new technological environments on the workforce can be found at <http://www.work-with-it.org.uk/CaseStudies/PaperlessAdmissions.aspx>.

3.8 Part-time Working & Technology – Open University

In line with OU strategic objectives for 2007-8, the university is committed to embed eLearning and the use of ICT at the centre of the student experience. These drivers mean that all OU students and part-time tutors must have access to the internet, wherever they live. Since the end of 2004, there has been a mandatory two year induction programme for tutors and an allowance within the contract for up to two days per year of continuing development activities for those who are more experienced. Since 2004 all tutors must have access to the internet for administrative purposes, but also increasingly for supporting learners. The adoption of ICT into the working practices of part-time tutors has been a gradual process over the last decade. Arguably innovators and early adopters may relish learning new skills to master the innovation. In contrast, later adopters have a different attitude to the innovation, and may be more critical of its value and application, in comparison with existing ways of working.

This Work-with-IT case study explores the adoption of ICT into the working practices of part-time tutors within the OU through the eyes of early and late adopters. The six tutors selected represent a range of faculties and uses for technologies; some have a portfolio of contracts with the OU and others work for other institutions during the day. For three individuals, IT has been a part of working life for a considerable time. For another two IT has been new and often disruptive in the last couple of years. The final contributor is a member of Faculty staff who is responsible for line managing tutors.

Further details of these experiences and the analysis of the impact of new technological environments on the workforce can be found at <http://www.work-with-it.org.uk/CaseStudies/PartTimeWorkingTechnology.aspx>.

3.9 Knowledge Exchange across Rural Borders – National Rural Knowledge Exchange

The National Rural Knowledge Exchange is a knowledge exchange service provided by universities and colleges for rural businesses and organisations. It is funded by the Higher Education Funding Council for England (HEFCE), and is one of 22 Centres for Knowledge Exchange activity in the country. It has involved syndication of information and resources within and beyond the 14 university and college partners in the project and provided infrastructure to support this engagement. The project has supported a geographically disperse team of staff hot-desking between home offices and a number of regional academic bases, and has engaged with a wider group of institutions and their staff, in the course of initiating a business-facing profile-building process.

This Work-with-IT case study examines the responses to and outcomes of these challenges, and the lessons learned from supporting engagement with such inter-organisational digital environments. Contributors were selected from a broad range of types of staff, collaborators and contributors to the National Rural project including: an enterprise development director, regional managers, employer engagement specialist, hub co-ordinator, regional team members and an IT consultant.

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Further details of these experiences and the analysis of the impact of new technological environments on the workforce can be found at <http://www.work-with-it.org.uk/CaseStudies/KnowledgeExchangeacrossruralborders.aspx>.

3.10 Regional Management Information Systems

With a student cohort of approximately 28,000 learners and 900 staff NWRC is a significant provider of learning across a very broad curriculum. The task of managing a college of this scale, with the volume and geographical dispersal of its learners, provides onerous challenges to managers and other staff at the College - challenges that are significantly replicated across the five other FE colleges in the region. North West Regional College (NWRC) is one of Northern Ireland's six FE Colleges and emanated from a reorganisation of the FE sector in 2007. The result of the merger of the former Limavady College and North West Institute, NWRC has significant campuses across three of the north west of Northern Ireland's major centres of population, Limavady, Londonderry and Strabane.

This Work-with-IT case study explored the experiences of North West Regional College in unifying their Management Information System to support decision making by middle and senior managers across recently merged colleges. West Regional College was the result of a merger in August 2007 between Limavady College and North West Institute of F&HE. The study outlines the testimonials of a number of staff with key roles in providing and using the information that drives College activities and were responsible for ensuring a smooth transition of MIS systems.

Further details of these experiences and the analysis of the impact of new technological environments on the workforce can be found at <http://www.work-with-it.org.uk/CaseStudies/RegionalManagementInformationSystems.aspx>.

4 Advice and Guidance

The advice and guidance material was developed from synthesis of workshop and case study materials. As per JISC's ITT, the material was designed to be of use to managers involved in staff development and/or change management. Quotes and extracts from various case studies were used to illustrate key changes, their impact, and innovative approaches to resolving the many challenges surrounding effective implementation of technology-enhanced working practices. Recommendations for skills development and a quick summary (bullet points) of effective practice tips were also developed.

The material was peer reviewed by eight staff development and change management practitioners from HE and FE and subsequently revised as appropriate.

Readers are directed to the Work-with-IT project's report – 'Technology-enhanced working: Advice and Guidance for Staff Development and Change Managers' – for full details. The key recommendations and a summary of effective practice tips are presented below in subsections 4.1 and 4.2 respectively.

4.1 Recommendations for Skills Development

Digital Fluency, Sheffield Hallam University

"[The Executive Dean] remains committed to providing career development opportunities for all staff and believes that the development of an effective professional development strategy is pivotal to enhancing both the staff and student experience."

Identifying staff development needs in an evolving environment can be challenging, especially given the pace of technology-driven change. The evidence gathered during Work-with-IT strongly suggests that the **most effective practice is to make staff development a well-planned and structured undertaking, carried out in collaboration with staff and change agents and initiated in the planning phase, well in advance of changes being introduced**. Additionally, staff development needs to be highly flexible with the facility to provide additional training and support, where and when the need arises. This, therefore, requires an ongoing monitoring of staff development and encouragement of staff to be proactive in identifying their individual staff development needs.

The excerpt below, summarised from the Paperless Admissions case study at Coventry University, illustrates how this can be implemented in a particular context. See the other case studies (<http://www.work-with-it.org.uk/CaseStudies.aspx>) for examples of different approaches.

Paperless Admissions, Coventry University

The University's staff development policy encourages individual employees to undertake job-related training. This is implemented either through an annual appraisal, providing an opportunity to agree training needs to meet individual or team objectives, or on an ongoing basis to address skills gaps and issues as they arise. In this sense, the system is sufficiently flexible to allow a range of training solutions to meet business requirements.

Consultation with paperless admissions stakeholders revealed a number of skills issues relating to the implementation of the new working practice. These largely supported the views of individual Recruitment and Administration Office (RAO) staff, garnered during one-to-one discussions to inform personal vignettes. The issues identified primarily relate to 'soft' personal attributes rather than technical skills. They include:

- Confidence, for example, to make final decisions on offers to University applicants or to take on additional responsibilities;
- Time management, for example, in being able to structure the working day to allow adequate breaks from working at a VDU;
- Self discipline, in being able to manage competing priorities within the RAO.

Coping with pressure generated by, for example, the perception held by individual staff that the paperless system creates additional scrutiny through increased visibility of workload.

These have been addressed in a number of specific ways:

- In house solutions involving hand-holding and shadowing of staff taking on new responsibilities;
- Installation of a strong team ethic encouraging shared solutions to problem solving;
- Empowerment of co-ordinators to make decisions with the reassurance that it is human to make mistakes;
- The provision of dedicated health and safety training alongside the introduction of structured; VDU breaks for the whole team, as well as reassurance that staff are not expected to be at their workstation for the entire working day;
- The installation of a self-discipline culture through the concept that staff are in charge of their own diaries and, as such, manage their own workloads. They are thus empowered to say no to requests from colleagues that clash with their existing diary commitments;
- Managing change in a positive way through using reporting tools available through paperless admissions to demonstrate and celebrate achievement rather than scrutinise progress;
- Job rotation within teams in order to provide variety and keep people fresh and able to cover for one another;
- Use of external consultants to deliver bespoke training [e.g. to meet gaps such as advanced presentation skills, thereby assisting individuals taking on new and additional responsibilities as school liaison officers]. Provision is tailored to the exact requirements of the business, and backed up by in-house coaching for less confident staff;
- Dedicated bespoke training within team meetings to update staff on current practice;
- Provision of opportunities for staff to attend relevant conferences which suit the particular needs of their own role.

The package of solutions identified above are generally used in preference to dedicated centrally provided University training courses, owing to the fact that such provision is (a) often too generic and (b) provided out of step with the requirements of the business.

Just-in-time training to ensure staff have the required skills and flexible mindsets is important. Space – time and a place – for on the job development needs to be planned. Incentives need to be provided to encourage staff to actively engage with improving their skills on an ongoing basis. Whether the above training needs can be built in to CPD accreditation should be explored.

Development of a **base-line of required skills and competencies for institutional staff** that is **complemented by role specific skills requirements** is recommended. The following groups of skill sets are identified as essential for staff and senior management if institutions are to work in new ways that exploit the benefits afforded by new technologies.

4.1.1 Coping with change

The ability of staff to cope with change on the one hand and of middle and senior management to successfully implement change on the other is viewed as critical. This should include, but not be limited to: **adaptability and flexibility, lifelong learning, project management** and **change management**. It is also felt that line managers could inadvertently act as a barrier by failing to build in training and exploration time for staff. Thus additional team management skills and checks to ensure that they are applied in practice are required.

Development of softer skills such as adaptability and flexibility and lifelong learning is perhaps not best suited to traditional staff training. Rather, these soft-skills are best developed in a more holistic way that encompasses both team activities and individual learning and reflection. Critical will be designing development programmes to help staff become **reflective and innovative practitioners**. These are precisely the skills that academics strive to embed in their students – reflection, critical thinking and the ability to think outside the box within a constructivist framework.

4.1.2 Social and relationship skills

Lesley, Lecturer, Online Course Delivery, UHI Millennium Institute

“...social and relationship building skills have changed and adapted. When you teach online you need a relationship beyond just the content, to try to engage the student as an individual”

Technology-enhanced working brings together different groups of people in an artificial world where common social signals are missing. Staff working in such environments need **enhanced relationship skills** to cope in the virtual world. Difficulties in bonding in cross-functional and often virtual teams are a particular issue. Team building exercises prove highly effective in overcoming such issue as does scheduling face-to-face contact time.

Additionally, staff require support to develop appropriate skills such as **empathy** and **motivation**. One method of increasing motivation is through development of policies which illustrate to staff that an institution is consultative and empowering, supportive and

encouraging of staff innovation. Further, self-assessment tools which enable staff to examine their own personality and the advantages and disadvantages of their preferred method of work will aid understanding of personal motivational drivers and help staff increase their personal effectiveness.

Constant online connectivity means that staff must utilise a range of tools and skills to **manage boundaries**. This may be in the form of assertiveness training to help staff set and reinforce electronic 'do not disturb' signs using, for example, instant messaging software or explanatory out of office emails to say 'don't disturb now, but I'll get back to you ...'. Colleagues also need advice on understanding and respecting these boundaries. Anecdotal evidence suggests that these boundaries are better respected when they have been 'negotiated'. For example discussion with colleagues regarding the strategy an individual e-worker wish to adopt helps control expectations - colleagues understand that rather than slacking, the e-worker in fact busy. Further, such discussions also help the e-worker to feel their colleagues better understand the working practices and thus reduces self-induced pressure to respond immediately even when it is highly unproductive to do so. Finally, an equally important skill, as the King's College London case study noted, is awareness of when it is time to switch off:

Torsten Reimer, Development Manager, e-Research, King's College London

"Leisure time has now become more of an active decision than something determined by a nine-to-five day."

4.1.3 IT-Related Skills and Training

As well as **basic IT literacy skills**⁸ such as how to use various desktop applications, development of the following IT-related skills are recommended;

Information management skills are required if staff and students are to make effective use of the vast array of information resources available. Finding and critically analysing information, assessing its reliability and ensuring that it is accessible to others to reuse effectively are key skills required. For example, academics and related staff are increasingly expected to deposit research outputs in an institutional (or subject-based) open access repository. To do so effectively, depositors are usually required to complete a basic metadata record to describe the item they are depositing within the repository. Rudimentary catalogue skills, pertaining to local practice and institutional policy, are therefore required.

⁸ While the inclusion of basic IT-skills in an institutional baseline may appear inappropriate for some categories of manual staff, Leeds University views it as a duty of care to provide all staff with the opportunity to obtain basic IT skills, with Internet Cafes and training being provided for those without desktop access.

The appropriate assignment of keywords, for instance, will ensure that other repository users are able to subsequently access and make use of deposited works.

Further, if institutions are to minimise risks due to misuse, staff need to understand the impact of legislation and local regulations. For example, knowledge of copyright awareness and compliance is also essential to ensure that protected works are not made illegally available within an open access environment. Services like SHERPA's RoMEO [25] can provide assistance with this.

Information management skill sets are most effectively developed when the training is informed by information professionals and legal/regulatory experts. JISC Netskills and JISC Legal provide further training and advice to institutions in these areas.

The ability to **optimise use of technology** is another key skill required of staff if institutions are to capitalise on the opportunities offered by technology-enhanced working. For example, staff developing large projects down to individual academics wishing to provide an innovative learning experience need to be able to make well-informed choices regarding the use of technology. This does not mean that all staff need to become technology experts, rather they are sufficiently IT literate to make informed decisions and to be able to hold informed discussions with technology experts. Indeed, knowing when to involve experts and **how to effectively communicate between technology specialists and subject or business specialists** is key.

Training, in this case, should be centred around effective communication techniques as well as in broad (high-level) technology concepts and processes. Further, training requires to be complemented by well-integrated support and advice services and key champions who can bridge the technology-business/subject gap.

Enhanced Vocational Training Case Study Report, Impact Analysis, West Lothian College

The college has set up three "E-learning champions". These are assessors who have been involved in the development of the portfolio from its conception and use it daily. They provide regular workshops and advice to all and have direct and regular contact with the software developer.

Soft IT-related skills and competencies such as technology confidence and a willingness to innovate are also increasingly required. The Digital Fluency Initiative at Sheffield Hallam University is designed to address such issues as the following summary explains;

Digital Fluency Case Study, Sheffield Hallam University

The aim of Digital Fluency Initiative is to raise the profile of digital fluency, to embed it as a core graduate attribute and a key element of professional development for all staff. Put simply digital fluency at Sheffield Hallam University is characterised by the necessity to *'live learn and work in the digital age'*.

Digital fluency has as its core elements, information literacy and IT competencies; however, as the web has evolved from an information delivery vehicle to a place for collaboration and interactions, the new skills needed to perform effectively in these environments are increasingly important. They include being socially adept online, writing for appropriate audiences and contexts, and having the skills to engage in online debate and discussion. There is clear evidence that our incoming students have high expectations about learning in e-supported environments. They also expect that, regardless of their starting point, their experience whilst at university will help them to build their own digital capabilities and confidence.

Although many staff are becoming more confident users of digital technologies, as with our students, there are differing levels of confidence and need. The challenge of supporting our staff to build their digital capabilities is critical. *'If further and higher education institutions are to continue to successfully deliver their core business, staff i-skills have to become a fundamental feature of all staff development policies'*.

Investigating the staff and student experience revealed that whilst there is dedicated institutional support for Information literacy and IT skills, it is difficult to identify support for online interactions or the development of critical thinking in digital domains. In addition, the emergence of digital environments has blurred the boundaries between these core literacy's. We, therefore, need to review the blend of support and resources on offer and develop an approach that makes sense of this complexity for our students and for academic staff.

For academic staff, not only must they understand the need to develop these competencies to support their own efficiency and effectiveness but they must also be capable of fostering digital fluency skills in their students.

Change of this nature can only be delivered through partnership and collaboration and this has been built by creating integrated delivery teams to explore ways of providing more coherent and pervasive support that is clearly focused on developing the capabilities of all our students and staff to meet their individual needs. These teams involve; Educational Developers, Educational Guidance specialists, Faculty Learning and Teaching Coordinators, Faculty E-Learning Advisers, Information Professionals, IT Professionals

Whilst there is still much work to do, there is clear evidence that the imperative of digital fluency is starting to be recognised. The University's Corporate Plan 2008 - 2013 (currently in draft) sets out the institutional expectations of digital fluency for students and for staff. However, strategic change can only be delivered by recognising the importance of the underpinning cultural change and ensuring that message on digital fluency is consistent and pervasive across all areas of the institution. This will require continuous engagement to ensure that; digital fluency remains an institutional strategic priority; that there is a commitment to review the role profiles of all staff and to define the graduate attributes of our students.

4.2 Effective practice recommendations

Key tips and recommendations for supporting and managing technology-enhanced working practices are summarised below. These will be of interest to senior managers and those involved in managing change and staff development. Many of the tips and recommendations, especially the staff development ones will also be highly relevant to individual members as well as line managers. The background to these effective practice recommendations and their implications are discussed in detail in the advice and guidance documentation produced by Work-with-IT (<http://www.work-with-it.org.uk/Advice.aspx>).

General:

- **Establish a holistic approach** that embraces effective project management, change management and staff development procedures and key practitioners from the outset of the new working practice;
- **Monitor and update relevant policies and strategies on a regular basis** to ensure that they are kept up to date with current working practices and their wider implications for university staff and students.

Change Management:

- **Establish a staff consultation and communication programme** that begins well in advance of the roll-out of the new working practice. This is most successful where staff stakeholders, including those who will deliver or be affected by the new working practice are given the opportunity to inform development from the outset. Given the wide ranging impact, this will need to cover a wide range of stakeholders and business areas, potentially covering a range of institutions.
- **Establish a horizon scanning facility** that identifies emerging technologies and innovative practice. This is increasingly important as institutions need to both keep abreast of and support individual staff and student led innovative practice.
- **Establish and communicate appropriate support structures for the technology-enhanced working;** solutions will depend on scale, location, expertise and competency base and the particular technology involved.
- Consider carefully whether it would be more beneficial to make **hidden change agendas explicit**. This helps technology to be viewed as the solution rather than change for changes sake.

Staff Development:

- **Build in career evolution** as part of the change management process. Careful consideration needs to be given to not only internal opportunities but also how developing roles fit within academia and other sectors.
- **Establish a baseline skills requirement for digital fluency** for staff that includes both 'hard' and 'soft' skills. Given the rate of change of technology this will need to evolve over time.
- **Develop a staff development policy** that is not only linked to Personal Development Planning at key intervals, but is also sufficiently flexible to allow staff and line managers to recognise and satisfy key training needs as and when they arise
- **Establish a Recognition and Rewards Scheme** that celebrates staff achievement to ensure staff are not only rewarded for their innovations but also encouraged to engage in good practice
- **Establish a staff training provision that not only meets 'hard' technology related skills but also 'softer' skills** such as communications, coping with change and managing boundaries. Staff should be supported in their Personal Development Planning to assess these softer gaps. Ensure support and training is provided not just to those staff directly affected but also to those impacted by the change.
- **Develop line manager leadership and innovation skills.** This is key as line managers are pivotal to successful, flexible and innovative team working and helping staff overcome concerns regarding technology
- **Encourage a collaborative 'can do' culture** where staff support each other to solve problems. Key here is to allow staff to try new things in a supportive environment.
- **Monitor and evaluate changes to working practices** to identify what works, what does not and the implications for future changes. Qualitative and quantitative methods should be used and the lessons learned synthesised for wide dissemination, so others may learn and fine tune their own effective practice.

5 Exploring the evolution of technology-enhanced working practices

Technology is but one of a broad range of factors and influence which affect the evolution of working practices. The second phase of Work-with-IT (April-June 2009), therefore, examined changing working practices, staff roles and responsibilities from a wider perspective through exploration of the remaining PESTLE dimensions – Political, Economic, Social, Technological, Legal and Environmental.

The study of technology-enhanced working practice and reflection on its impact and institutional context, undertaken during the original ten Work-with-IT case studies, helped develop considerable expertise within these institutions. The Work-with-IT project therefore revisited these institutions to help explore the non-technological PESTLE factors associated with changing working practices and how these factors might influence the evolution of working practices, staff roles and responsibilities. A two-pronged approach was adopted: (i) investigation of the role that PESTLE factors played in the evolution of innovative working practices within the case studies; and (ii) exploration of how PESTLE factors could potentially influence working practices and roles over the next five years. This was achieved through a ‘scenarios’ workshop which was held on 28th May 2009 at JISC Netskills in Newcastle and a series of semi-structured interviews with the individual case studies. These activities were further complemented by drawing on experience from an earlier ‘Scenarios Development’ event held as part of JISC’s Changing Staff Roles and Responsibilities Programme and general desk research.

This section presents the general results of the PES(T)LE exploration. First, in subsection 5.1, the factors identified for each PES(T)LE dimension are discussed in turn, with illustrations from the Work-with-IT case studies. How these factors might affect the sector and its working practices and staff roles and responsibilities in the next five years is then explored in subsection 5.2. The section ends in 5.3 by reflecting on the PES(T)LE process, the potential implications for staff roles and responsibilities and how institutions might effectively address them. The individual PES(T)LE exploration undertaken for the Work-with-IT case studies can be found on the project website – <http://www.work-with-it.org.uk>.

5.1 PES(T)LE factors

The PES(T)LE dimensions – Political, Economic, Social, Legal and Environmental – were used as a framework to explore the external macro environment (i.e. the big picture) in which HE and FE operate. These factors are in general beyond the control of institutions but as JISC infoNet advise they are key considerations in institutional planning [26]. Many of the factors identified could be categorised as belonging to more than one dimension. This difficulty arises largely from individuals’ differing perspectives and the fact that the PES(T)LE dimensions are interrelated. The categorisation of PES(T)LE factors presented in a)-f) below is therefore just one possible way of presenting a general summary of factors affecting the sector. Within each dimension key factors are identified and their relative importance now and over the next five years noted. While analysis of the technological dimension was not part of the scope, the key factors which have been identified from other aspects of Work-with-IT are also present for completeness, although they are discussed in detail elsewhere.

a) Political

The political PESTLE dimension relates to the key political drivers which could influence an organisation. JISC infoNet advise that for the HE and FE sector these are likely to include worldwide, European and government directives, funding council policies, national and local organisations' requirements and institutional policy [26]. The Work-with-IT PES(T)LE investigation identified four broad categories of political factors currently influencing or likely to influence institutions in the near future: central or devolved government policies; local policies; efficiency drives; European Union and other international policies. Political policies are of course intertwined with associated economic factors and together political/economic funding drivers can have a major effect upon institutions. While funding policies could also be attributed to the political dimension, they are dealt with under the economic dimension in subsection b).

Cutting across these factors is a potential change of UK government. While at the time of the PES(T)LE investigation – April-June 2009 – the participants were unclear regarding exactly how this might play out, there was a strong feeling that a change in government would bring a significant change in education and employment, research and business policies and efficiency drives. The resultant uncertainty regarding the political landscape was expected to drive institutions to assess how they might be affected by a variety of potential policy changes.

Central and devolved government policies

Political policies such as education, employment, business and industry, science, environmental and economic policies set sector trends that impact upon the types of student institutions target, the modes of curriculum design and delivery and the research activities they adopt. Government initiatives surrounding employability, graduate attributes, lifelong learning and wider issues such as health and education in the community can have a transformative knock-on effect upon institutions.

A key PESTLE factor for Sheffield Hallam University and its Digital Fluency initiative surrounds graduate attributes and employability. This is leading to a general push towards alignment of the learner experience with these policies. This shift is led by the institution to a certain extent but more so by prior experience and changing expectations of the individual learners.

Digital Fluency case study, Sheffield Hallam University

Research policies of the funding and research councils and knowledge exchange initiatives emanating from the funding councils are also significantly changing the research practice and business community engagement of institutions. For example, research pooling initiatives funded by the Scottish Funding Council are transforming the research landscape and encouraging collaborative working across institutions [27]. Similarly, the HEFCE-funded Centres for Knowledge Exchange are encouraging institutions to develop innovative

partnerships and good practice between institutions and business within specific localities, regions or sectors [28].

Funding made available to institutions, usually through dedicated project work sponsored by organisations such as the funding councils or JISC, can spark research and innovation across many areas of practice and this can in turn lead to new approaches and processes that eventually become embedded in institutions. While government policies and initiatives encourage or in cases mandate institutions to align their strategies accordingly, as the Work-with-IT case studies illustrate, resulting institutional initiatives arise from a complex range of interrelated factors.

The National Rural project uses the power of the Internet to help rural organisations, networks, societies and universities, to pool and share information about their knowledge transfer events and activities. While social drivers such as communities of practice, the change in demographic of the student population, lifelong learning and location independent working while managing work life balance are all factors in the development of the project, the project itself is very much dependent upon political will – which comes in the form of funding from HEFCE and other funding bodies.

**Knowledge Exchange across Rural Borders case study,
National Rural Knowledge Exchange**

The PES(T)LE investigation also highlighted that government and funding council policies relating to graduate attributes and employability have been particularly influential in developing a new focus for curriculum development within HE and FE. Similarly, the Research Assessment Exercise (RAE) and the new Research Excellence Framework (REF) are directing institutional approaches to research excellence. However, it is unclear how these policies might be affected or indeed what new policies might be introduced if there is a change in government.

Efficiency drives

Political influences, be they in the form of government or funding council directives, often focus on streamlining educational provision to improve both quality and efficiency. As the Work-with-IT *Regional Management Information Systems* case study [29] illustrates, government decisions to encourage or indeed enforce merging of resources and systems are often dependent on wider environmental factors.

At North West Regional College political factors were very influential. Government bodies wanted a common Management Information System (MIS) that would provide records on which future college funding could be based. To achieve this, the government provided the development with funding and directed the roll-out of the new system. Economic factors also therefore came from this political back drop as the government were heavily involved in the distribution of funding. The MIS development was related to the government strategy of college mergers in Northern Ireland at the time to ensure more economic and business focussed provision. It is believed that while this may have been extremely difficult to achieve in the past, the new political stability in Northern Ireland probably made it easier for the colleges to merge and work together. It could be said that there is also a vested political interest in maintaining good relations and continued funding of similar initiatives (surrounding collaborative working practices and systems) that in turn help preserve political stability.

**Regional Management Information Systems case study,
North West Regional College**

The PES(T)LE investigation participants felt in general that there would be an increasing focus on efficiency drives, something which was unlikely to change should a new government take office.

Local and regional policies

At a regional or local level, political policies and initiatives designed to address local needs also significantly influence HE and FE institutions. Local economic and social issues are often a driver in areas of high unemployment such as inner cities or rural areas. For example, in the Work-with-IT case studies, political initiatives that provided funding to explore knowledge exchange and cross-boundary working were often born out of attempts to bring geographically disperse communities together, while taking into consideration possible benefits to wider areas of concern such as agricultural and rural communities and 'rural health and well-being'.

Political agendas such as local education provision and the wish to develop and retain a highly employable workforce within the Highlands and Islands region are key drivers for the University of Highlands and Islands (UHI) Millennium Institute and their on-line course provision. Similarly political agendas to improve rural health and well-being of children also indirectly influenced the courses provided here.

UHI Millennium Institute

The PES(T)LE investigation suggested that there may also be further moves towards local initiatives and partnerships, especially in FE, where links with local industry and commercial business often provide much needed funding and community engagement.

From a political/economic perspective, local partnerships or initiatives designed to address unemployment and employability are also expected to be formed at West Lothian College.

West Lothian College

European and international policies

National policies outside the UK can also affect institutions, especially when they are reliant on overseas students for funding. For example, a change in policy that may see a switch from a country sending its postgraduate students abroad to building its own local provision, could significantly impact many HE institutions. Further, more specific policies such as only funding students to attend top ten ranked UK institutions can have significant implications for institutions should their position in national rankings drop.

From a European perspective, student mobility, research funding and regional development policies have a significant impact on HE and FE in the UK. For example, the Bologna Process aims “to create a European Higher Education Area by 2010, in which students can choose from a wide and transparent range of high quality courses and benefit from smooth recognition procedures” [30]. One immediate impact of this is that UK institutions who wish to participate in student exchanges in the EU need to structure their course credit system to be compatible with the European Credit Transfer System. Similarly, EU Research Framework programmes are designed to develop the research profile, the knowledge economy and society in Europe. The funding streams available significantly direct the research foci of many HE institutions and open up opportunities for European collaborations.

Research is inherently a very international field and European funding will continue to be very important source of income for the E-Research Centre at King’s College. The research technology and infrastructure can only be build properly in an international context and that there is a general trend for more international research collaboration and therefore King’s College need to work with people with similar backgrounds and needs to continue to be successful.

E-Research case study, King’s College London

b) Economic

Stability of the economy across the UK and the globe, and trends such as consumer behaviour, general taxation issues, interest and exchange rates all impact upon every sector of society and education is no exception. According to JISC infoNet [26], economic factors pertaining to the HE and FE sector are likely to include: funding mechanisms and streams; business and enterprise directives; internal funding models; budgetary restrictions; and income generation targets. The PES(T)LE investigation revealed that the current economic recession, together with increasing consumerisation and international markets, were the principal economic factors affecting the sector. Further, if current trends continue, the

participants felt that economic issues are likely to be the dominant PESTLE factor for the foreseeable future.

The recession

The effects of the current global recession are increasingly becoming of prime importance to many institutions across the UK. The strength of the economy dictates the general structure of HE and FE through the availability of funding. During an economic down turn government priorities often change and this is revealed in educational fiscal policy, fee structures and the general strategic direction of the education sector. This eventually can force institutions to also prioritise in line with wider government objectives and leave them less room to pursue their own objectives as they struggle to maintain competitive advantage and secure continued funding. The most direct impact over the next five years is an expected reduction in government funding for HE and FE, leaving institutions increasingly cash strapped. This may result in leaner institutional approaches which concentrate on maintaining competitive advantage.

Economic factors for the wider institution were a major influence, with the major restructuring initiated by Oakland College's disappointing OFSTED results in 2003 and 2006 and the decision to build a new bespoke campus building to offset these already underway and unfortunately running into some financial complications. Oaklands College are also only too aware that the current financial climate and the decisions of funding and governmental bodies will undoubtedly have an effect on the outcome of most initiatives within the institution.

e-Mentor case study, Oaklands College

The recession may also positively and negatively affect relationships between commercial sectors and HE and FE. For example, there may be an increased demand from employers for the sector to provide flexible retraining opportunities designed to fit around business needs and timeframes, perhaps at the expense of student experience or current modes of delivery and staff expertise. However, while such demand may increase, employers' sponsorship of bespoke courses may decline as they too become increasingly cash strapped.

Finally, as is already evident, the recession will lead to increased unemployment. This is likely to result in a demand for retraining and an increase in traditional and part-time, self-funding mature students. Flexibility of access and payment will be important to the latter and this may place further pressure on institutions. This increase in demand may be countered by government capping of student numbers and fiscal penalties designed to reduce public spending.

Consumerisation

The structure of institutional funding and the top-up fee system in parts of the UK mean that student numbers increasingly affect an institution's funding. Published student surveys and league tables can have a major effect upon institutional reputation both in the UK and the

global market and this can have serious implications for student and staff recruitment. Many students (particularly international students) will not even consider a UK institution not ranked in the “top ten”. Thus, as the OECD report on ‘The Impact of League Tables and Ranking Systems on Higher Education Decision Making’ [31] notes, these rankings help build and maintain institutional reputation as students, their funders and other organisations use the rankings to influence their decisions about accreditation, funding, sponsorship and employee recruitment. As a result, consumerism is becoming a leading factor in institutional policy and indeed risk assessment.

This consumer influence was a key factor in the teaching and learning related Work-with-IT case studies and is expected to continue to increase in importance over the next five years.

Student expectations of how they should communicate with staff and how their experience is provided – “the way they want, when they want” is a key driving force behind initiatives like Digital Fluency.

Digital Fluency case study, Sheffield Hallam University

International markets

Global markets and economies have a significant impact on HE and FE institutions. Recruiting international students to attract funding has become the norm in many UK HE institutions. External partnerships and international collaborations are also attractive to institutions particularly because of the opportunities they afford in research, technology and outsourcing of systems and solutions. As the UK enjoys a relatively stable political situation with long established trade links with most other countries in the world, it is a natural progression to extend educational partnerships and knowledge exchange beyond national borders in the pursuit of financial gain. The strategic and structural impact of inter-country relations on institutions is far reaching and there has been a focus on international mobility under differing government administrations for decades.

Internationalisation and global markets are becoming increasingly important for the Open University and these factors will undoubtedly have a knock on effect on students. Strategies, emerging markets and technologies all drive changes in trend.

Part-time Working & Technology case study, Open University

As the sector is already experiencing, globalisation is leading to increased competition for students. UK institutions can no longer rely on attracting students from foreign markets such as South East Asia as regional world class institutions can now provide high-quality and often more locally relevant learning experiences. However, globalisation also presents opportunities in for example the provision of distance learning. Further, as the Work-with-IT case study on *Enhancing Vocational Training at Work* [32] demonstrates, local economic needs can potentially open up unexpected international markets.

One of the key PESTLE related drivers for West Lothian College was to develop and retain competitive advantage through its e-portfolio product and the vocational training at work which it supports. The institution has since been approached by overseas institutions interested in the innovative e-portfolio product and approach.

Enhancing Vocational Training case study, West Lothian College

c) Social

The social PESTLE dimension relates to external societal and cultural aspects which could influence an organisation. JISC infoNet advise that within the HE and FE sector these are likely to relate to attitudes to education, general lifestyle changes, changes in populations, distributions and demographics and the impact of different mixes of cultures [26]. The Work-with-IT PES(T)LE investigation identified four broad categories of social factors currently influencing or likely to influence institutions in the near future: student skills, lifestyles and expectations; staff skills, lifestyles and expectations, the trend towards membership of multiple social networks and communities; and the community in which institutions are situated.

Student skills, lifestyles and expectations

The demographics and expectations of prospective and current students increasingly influence institutional and individual staff approaches to learning and teaching. Students' skills and expectations are influenced by prior experience in school and leisure activities as well as general economic and employment trends. While the National Student Survey [33] influences institutional approaches, institutions are also increasingly looking towards their catchment community.

Student demographics and other associated shifts in student attributes and expectations will have the biggest overall impact for Sheffield Hallam going forward. Monitoring changes at primary and secondary school level is helping give an insight into what set up will work best when students reach university level. This is accompanied by ongoing monitoring of sector trends relating to graduate attributes and employability, the wider issues surrounding political direction in the UK and educational funding in line with industry demand.

Digital Fluency case study, Sheffield Hallam University

According to the 'Higher Education in a Web 2.0 world' report, student expectations regarding learning are not currently radically changing [34]; however, there is an increasing demand that the learning experience accommodates students' part-time employment. Further, online consumer trends combined with students' increasing familiarity with using the Web for information and communication is encouraging institutions to communicate and market their courses electronically as the Work-with-IT case study of *Paperless Admissions* at Coventry University illustrates [35].

Finally, as the trend towards lifelong learning continues, the age, ratio of part-time to full-time students and the type of courses sought will change.

While social drivers relating to student skills, lifestyles and expectations were rated reasonably high in the PES(T)LE investigation, unexpectedly they were not the prime social factors.

Staff skills, lifestyles and expectations

Institutions will also be influenced by the pool of available staff and their skills, lifestyles and expectations. As the HEFCE Flexible Employment Options Project [11] illustrates, work-life balance is increasingly important to staff and their institutional employers. Staff are increasingly expected to take a flexible approach to working hours – both non-standard and reduced hours – and home working to fit their work better around family life. Of the Work-with-IT case studies, the *Location Independent Working* [36] and *Part-time Working & Technology* [37] case studies reported staff lifestyles and expectations were indeed important influences but not the primary drivers for the working practices studied.

Staff whose skills are in high demand are also likely to be influenced by ethos, reputation and institutional plans when choosing an employer. As technology becomes further embedded in working practices, the PES(T)LE investigation participants felt that an institution's approach to, and support of, emerging technologies may increasingly affect staff choice of employer. However, as the participants noted, the current economic downturn has created an environment in which staff skills, lifestyles and expectations may become of lower priority for institutions.

Social Networks and Communities of Practice

As discussed in sections 2 and 6, the increasing trend towards the use of social networks for business and leisure activities is affecting both staff working practices and the student experience. Institutions will operate more and more in an environment where the boundaries between work, learning and leisure become blurred. Further, staff and students will increasingly be members of a range of communities. While this affords new opportunities for innovative educational experiences and research practice, it also potentially presents problems as the distinction between an individual's virtual work and social persona becomes blurred. These influences and issues are discussed in greater detail in section 6.

Collaborating with people outside the institution is very important for this case study and there can be a blurring of boundaries surrounding both working with people outside your own institution and through the very nature of working in a technical field – when you work, how you work, content, working practices can all become “blurred”.

e-Research case study, King's College London

While the blurring of identities and boundaries was not identified as a key factor at present, the PES(T)LE investigation participants felt that this would become more important over the next five years. Communities of Practice, however, were viewed as the key social factor at present.

Community

Institutions are influenced by the community which they serve, be it a local community as in the case of FE institutions or a potentially wider community in the case of HE. Additionally, as in the case of the Open University or the UHI Millennium Institute the community may be geographically spread. The social profile of an institution's community can significantly affect the learning experiences it provides. The PES(T)LE investigation indicated that the social demographics of an institution's catchment community is increasingly likely to affect institutional planning over the next five years.

From a social perspective, at the UHI Millennium Institute there is a clear agenda to widen access to education while enabling people to remain within their local communities. There is a strong sense of belonging in these communities and local, albeit on-line, provision of higher education allows students to further this sense of local belonging while achieving their educational goals.

Online Course Delivery in a Disperse Environment case study, UHI Millennium Institute

Where there are social difficulties within the community in which an institution is situated, political initiatives, targeted funding and a need to improve student numbers encourage institutions to undertake public and community activities to increase social cohesion or enhance the educational prospects [38]. Thus, engagement with an institution's local or catchment community is increasingly important as JISC's Business and Community Engagement programme [39] illustrates.

d) *Technological*

JISC infoNet define technological factors as major current and emerging technologies of relevance for teaching, research or administration [26]. Work-with-IT project investigations revealed the key technology trends impacting upon HE and FE surround the growth of the global technology environment (World Wide Web, Virtual Worlds, Cloud Computing, Open Source solutions), the increased social and participatory nature of technology (Web 2.0) and the availability, rate of change and longevity of technology solutions (Broadband availability, mobile technologies etc). These trends were explored through Phase I of the Work-with-IT project (impact of technology upon staff roles, relationships and associated skills) and also Phase III (effect of Web 2.0 upon the evolution of working practices, staff attitudes, roles and responsibilities). See sections 2 and 6 for full findings and synthesis.

e) *Legal*

Legal PESTLE factors, described by JISC infoNet as European and national proposed and passed legislation [26], have also been impacting upon HE and FE. As JISC Legal [40] advise, areas of consideration include: Copyright/IPR, Data Protection, Freedom of Information, Human Rights e-Commerce, Accessibility Law, Defamation, Harassment, Computer Misuse, Terrorism, Interception and Monitoring, Hosting Liability, Employment Law. Factors emerging from the Work-with-IT PES(T)LE investigation in general correlate

with this, the addition being the identification of more general consumer rights issues arising from the increasing trend of 'students as consumers'. The PES(T)LE investigation suggested that the "fear of litigation" relating to compliance and consumer rights is of significant concern to many institutions.

Compliance

There has always been an awareness of rules, standards and legal compliance within HE and FE institutions and as the provision of education evolves through the introduction of technology or other new approaches, the need to fulfil legal requirements and adhere to regulations grows. Traditionally, compliance with health and safety regulations, disability legislation or indeed the provision of an appropriate "fit for purpose" infrastructure were the dominant issues for institutions. Like any other business or corporation these rules and regulations were perhaps easier to understand and indeed translate than some of the new challenges facing institutions today. More recent legislation surrounding compliance with regard to information storage, reuse and data management and consumer rights and laws surrounding the quality of service (in this case education and research) provision are creating a new legal dynamic that has yet to be fully understood or indeed guarded against.

Legal factors will also probably become more prevalent at North West Regional College. Equality and learner diversity will become very important and this will need to be formalised.

Regional Management Information Systems case study, North West Regional College

A growth in technology has led to the opportunity to store, reuse and manage data in a number of new ways and in a number of new places. Together with a general demand for better access to better information this has resulted in a marked movement away from traditional information management (in-house, paper based) and towards a diversity in approach that utilises technology and relies upon collaboration and shared solutions. This shift has brought new legal challenges particularly with regards to security, data protection, increased responsibility and indeed liability. Growth in technology has afforded collaboration opportunities that encourage open source solutions and shared information platforms, while requiring regulation and moderation to ensure standards and guard against legal challenge. Sharing information across communities of practice and indeed across the globe also brings challenges as regulations can vary between institutions and countries making it difficult to establish accountability, enforce best practice and ensure compliance.

Consumer Rights

The increasing move towards students as consumers also exposes institutions to many issues relating to consumer rights which were not of prime concern in the past. Perceived lack of duty of care or quality of provision can bring complaints and could potentially lead to institutions or individual staff being sued or at the very least to a damaged reputation.

The University of Bristol made the headlines in May 2009 when it was hit by a rebellion from hundreds of angry undergraduates of Economics, Finance and Management, who submitted a series of complaints expressing dissatisfaction with the quality of teaching. Since then, protests about teaching hours, class sizes and facilities have followed.

University of Bristol Student's Union Press Release [5]

The lack of knowledge surrounding the existence of legal precedents and the small number of legal challenges to date may lead to out of court settlements as institutions lack confidence in decision-making on consumer rights issues e.g. students who challenge the "quality" of teaching at an institution; as it is difficult to predict the outcome of the litigation it may seem better to limit the damage than to charter unknown territories.

f) Environmental

The environmental (or ecological) dimension relates to the physical environment in which an institution operates. As JISC infoNet's PESTLE overview advises, these are likely to include: local, national and international environmental impacts; and outcomes of political and social factors. The PESTLE investigation identified three broad environmental factors which are currently influencing institutional planning: the availability and fitness of estate; global warming and the green agenda; geography of the institution and its learners.

The availability and fitness of estate

Increasing shortage of estate that is fit for purpose and the potentially higher cost associated with the scarcity of estate were identified as issues for some institutions, particularly those located in city centres or those with aging buildings. This could potentially lead to a variety of differing solutions: a change of location; opening of a secondary campus; an increase in off-campus working and eLearning; sharing of physical resources between institutions; or a change in working hours and term-times to aid more efficient use of existing estate. As the UK HE's Space Management Group notes, evolving technologies and the changing student demographics also affect how institutional estate is effectively utilised - effective space management techniques are an important management tool in the increasingly dynamic and diverse higher education environment [41].

The availability and fitness of estate was a prime driver in the Work-with-IT case study – *Location Independent Working* [36], as well as influencing the *e-Mentors* [42] and *Enhancing Vocational Training at Work* [32] case studies.

In 2002 the Managing Director, as part of the annual review, demonstrated that Coventry University Enterprise Ltd (CUE) occupied the equivalent of one floor of the Innovation Centre. This level of occupancy was restricting space available for business start ups and constraining the company in meeting the objectives of the Technology Park to create employment opportunities in the region. Coupled with the knowledge that CUE would grow by another 50% in two years the Managing Director identified a need to reduce occupancy levels and increase flexibility within the company. Following discussions with IT technicians and research by a member of the management group the concept of Location Independent Working (LIW) was born.

Location Independent Working case study, Coventry University Enterprise Ltd

In the PESTLE investigation, the availability and fitness of estate was ranked as a prime driver and one which is likely to increase as the current economic climate suggests that there is likely to be less money available to maintain current estate. For example, one HE institution is currently examining ways of reducing its estate by 40%.

Global warming and the green agenda

The environmental impact of institutions is another key environmental factor. As the Suste-IT report into '*Sustainable ICT in Further and Higher Education*' [43] notes, institutions contribute to carbon emissions in a variety of ways – through travel and through power consumption related to heating, lighting and electrical equipment, especial computing equipment and data cooling systems. In response to this, a number of sustainable projects and initiatives have been sponsored to encourage HE institutions to move towards a low carbon economy. These efforts include: measures to increase environmental performance of institution (e.g. HEEPI [44]; the 'Greening' of ICT through cutting carbon emissions; and reducing power consumption in university and college computer areas (e.g. [45]).

Consideration of the green agenda was not a prime driver for any of the Work-with-IT case studies; however, it was a secondary consideration in the *Location Independent Working*, *Paperless Admissions* and *Part-time Working & Technology* case studies. The PES(T)LE investigation supported this view that consideration of the green agenda was not a prime driver for change. Further, while recognising the challenging carbon reduction targets currently being set by the government and the linking by HEFCE of capital funding to performance against institutional carbon management plans [46] means that institutions are increasingly likely to focus the environmental impact of their activities, participants still ranked this lower than other environmental factors.

Geography of the institution, its staff and its learners

The geographical location and spread of an institution, its staff and its learners also has a key influence on institutions. For example, working with disparate student bodies and campuses give rise to distinctive educational and resourcing problems.

The University of Highlands and Islands (UHI) Millennium Institute is federal in nature, comprising a number of separate colleges and research institutions which fit together under one umbrella. This diversity in specialisation and the unique nature of its dispersed geographical locations makes the UHI Millennium Institute unique within UK HE. The component partners range from world-class research centres to small learning centres, each with its own distinctive character and contribution. This diversity leads to a very distinctive vision for student education – focussing on local university-level education for local learners within a highly dispersed environment.

UHI Millennium Institute

Different time zones of students can be particularly challenging to support given traditional 9-5 working hours and the result is more evening and weekend working for support staff and academics. Collaborations can be developed with institutions in different time zones to provide out of hours support during their normal working hours.

Three of the Work-with-IT case studies – *Knowledge Exchange across Rural Borders*, *Online Course Delivery in a Disperse Environment* and the *Part-time Working and Technology* – were heavily influenced by the geography of the institution, its staff and its learners. For the others, geography was not an important issue. However, mergers due to the economic climate or emerging opportunities may in future increase the impact of geography on institutions in general.

The move towards remotely running the Enhanced Vocational Training at Work scheme at a number of locations around Scotland and potentially further afield may also drive changes to the content of courses. For example, there could be a move away from a workshop focus to on-line delivery of video content. It is believed this will also have implications for management of staff, where new management practices designed to support location independence will be required.

Enhancing Vocational Training case study, West Lothian College

5.2 Potential key trends within the sector

The PES(T)LE workshop and subsequent synthesis identified four key strategic trends likely to arise within the sector due to the PESTLE factors discussed in subsection 5.1: *lean thinking*; *flexible learning*; *risk management*; and *collaboration & sharing*. The first three identified trends and their likely impact upon working practices and staff roles and responsibilities are explored in turn below. The latter – collaboration & sharing – was considered in detail as part of Phase III of Work-with-IT and is therefore discussed within the context of the assessment of the impact of Web 2.0 technologies, presented in section 6.

These trends sit within a context of constant change. In reality, institutions may adopt strategies pertaining to a combination of these trends; however the discussion provides a flavour of what might occur. Exactly how an individual institution reacts will be mediated by

institutional culture, ethos, niche and leadership as well as the particular PESTLE factors which are important to the external environment in which the institution is operating.

a) *Lean thinking across all institutional activities*

Lean thinking [47] – where the focus is on prevention of unnecessary and ineffective activities or resources whilst adding value for the customer in a flexible and responsive way to sustain and improve organisational competitiveness [48] – is likely to increasingly permeate all institutional activity. Student expectation and satisfaction along with that of funders and business partners will inform direction. Lean thinking is likely to originate from top-down strategic direction developed in response to the current economic climate and government cuts. However, all staff will increasingly be expected to embed this ethos in their daily working practices. The lean thinking ethos will lead to streamlined organisations which focus on delivering strategic objectives in line with institutional values and pedagogy.

Bicheno's '5Ss' – sort, simplify, shine, standardise and sustain [49] – often underpin the implementation of lean thinking, having a significant impact on working practices and staff roles and responsibilities. For example, 'sorting and simplifying' is likely to have significant impact on many working practices as processes are assessed and evolved or are indeed discarded depending on their effectiveness in implementing institutional strategy. Quality of the learning experience and research outputs (i.e. Bicheno's 'shine') will also be key to competitiveness and will need to be supported by high quality, aligned professional services and infrastructure. To aid efficiency, institutional processes and technologies are likely to be standardised where feasible, and staff will be expected to abide by these standards. A sustainability focus is likely to require institutions to scope any new activity before it is proposed and provide a business case showing an assessment of the costs and benefits of the activity in relation to institutional strategy. Further, ongoing monitoring of existing activities will be necessary to ensure good performance, with all staff being expected to participate in and be responsible for monitoring and continued improvements.

The lean thinking approach is likely to expose staff to tensions – e.g. academic freedom and need for creativity and innovation versus standardisation; pedagogy versus focus on business cases; expectation to do more, but with less resources; research or teaching time versus time spent on monitoring of efficiencies etc. If tensions are to be minimised, all staff will need to become reflective practitioners, with a much deeper understanding of strategic objectives and quality and enhancement processes. Effective staff communication and development will be key to effective practice and will be aligned to institutional strategy.

However, as staff will be expected to take increasing responsibility for quality and efficiency in line with strategic objectives, roles will often subsume additional responsibilities. Further, as the sector is already beginning to experience there may also be a move towards incentive plans and performance related pay. Thus, there will be significant implications for human resources management.

The box below presents some research and knowledge exchange roles identified by the PES(T)LE investigation participants that may evolve in a lean thinking institutional environment.

Possible research and knowledge exchange related roles:

Business Directors & Managers: Horizon scanning and bridging the gap between business and HE/FE. Key skills: trend analysis; translating between business and academic perspectives; marketing and general business skills.

Research Directors & Managers: Concerned with directing and managing quality research teams and includes ensuring funded, internationally recognised research profile. Key skills: Project management; ability to write bids and secure funding; manage people engaged in research.

Communications Managers: Dissemination of research results, appropriately tailored to a range of business, academic and government targets in order to raise profile. Key skills: Strong marketing background; ability to balance income generation with academic integrity; managing demands of REF against institutional objectives.

Customer Liaison Managers: The focus is on establishing and maintaining effective relations with business and other research clients. Key skills: Ability to negotiate differing demands; identify and prioritise issues and who can resolve them.

Information Managers/Scientists: Provides expert support to aid members of the research and knowledge exchange team to effectively use and develop information resources. Key skills: Digitally fluent and able to facilitate open access and appropriate use of information.

Researcher-Innovator: Developing IPR. Key skills: subject specialist; collaboration; creativity.

b) Flexible Learning

Following on from the government's white paper on 'The Future of Higher Education' [50], flexible student centric approaches to learning have become increasingly common across the HE and FE sector. Underpinning this student centric approach is a 'democratising of education' where the focus is on student outputs rather than institutional outputs. The QAA's practical guide to Flexible Learning in HE and FE suggests five key components: time; content of the course; entry requirements; instructional approaches and resources; delivery and logistics [51]. More recently, individualised learning experiences are also being developed based on individual learning style preferences and objectives. Such personalised learning programmes as well as fast-track degrees which condense the study period (see HEFCE's *Flexible learning pathfinders* [52]) are likely increasingly to be offered throughout the sector.

These flexible learning solutions will affect the working practices of staff as well as students. Blended learning, which combines face-to-face with VLEs, is already well established, requiring staff as well as students to move between physical and virtual spaces. To provide a high quality learning experience, staff need to design the learning experience to use differing

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Version:2.0

Contact: Diane.McDonald@strath.ac.uk

Date: 13/03/09

mediums appropriately depending on their pedagogical advantages, the student profile and the learning objectives of the course. This student centric focus may require a change in mind set for some. Further, as discussed in more detail in section 6, understanding and effectively leveraging social interaction within learning will become increasingly important. Where face-to-face activities are undertaken may increasingly depend on the student profile. For example, in the FE sector, lecturers may travel to businesses or community centres to bring the learning experience directly to the learner.

The focus on flexible, student centred learning is likely to give rise to some tensions. While such flexible student-centric offerings may be viewed by some as adding another layer of complexity and work for academics, others will see opportunities to innovate and improve their professional practice. Further, as the flexibility of the educational experience increases, institutions will need to develop a strong framework which details how the differing choices relate and can be combined to ensure a quality learning experience which meets student needs. This may reduce individual members of staff's options to innovate, as there may be resource restrictions relating to physical spaces, technology or support staff. Thus, student-centred flexibility may impact upon staff choice. Additionally, flexibility in provision and fast-tracking means that institutions, academics and teaching and learning support staff may need to move towards 24*7*52 operations. The resulting teaching activities in the summer months may significantly impact on the research time of staff.

In order to support flexible delivery it is likely that staff will work as part of integrated learning delivery teams consisting of pedagogy experts, technology experts and tutors.

Possible Learning-related Roles

Learner Concierge: A customer service role, focussing on problem solving, acting as the 'bridge' between academics and students. For example, the University of Sheffield already have a "Concierge" role established in their library. Key skills: problem solver; translate between students and staff.

Learner Pathways Mentor: A student facing advisory role, which helps students articulate and match up their personal goals and navigate through the various learner pathway options which flexible learning approaches provide. The mentor may work across multiple institutions and provide practical advice about mixing and matching modules and learning providers to help the learner meet their objective in a timely and cost effective manner. Key skills: active listener; translate between contexts;

Blended Learning Co-ordinator: A pedagogy based role, which facilitates learning delivered in multiple environments – physical or virtual. Key skills: pedagogy expert; good communicator; match learning objectives and student profiles to tasks and environment.

Tutor: Responsible for delivering the learning experience to students. Key skills: proficient in multiple delivery modes; socially aware with the ability to build communities of practice and develop relationships; confident using e-Learning technology.

Peer Mentoring Support Officer: A more technical role that helps support tutors who are pedagogy focussed. As with the SOS Team (Scottish online Support) at the Open University, these may be early adopter tutors who are good with technology. Key skills: active listener; technical confidence and expertise; effective teacher

Education E-Researcher: A horizon scanning and research role which focuses current sector issues and stimulates peer discussion and reflection on current and emerging practice. Key skills: pedagogy and 'e' expert; critical thinking; good communicator.

c) Risk management

Management of risk is becoming more and more important to HE and FE institutions as a result of the compliance and consumer rights issues discussed in subsection 5.1 e). Further, as institutions are becoming increasingly accountable to customers (i.e. students) and external agencies (e.g. Quality Assurance Authority (QAA), Ofsted, HM Inspectorate of Education, Education and Training Inspectorate and Estyn), safeguarding quality and reputation becomes more and more important. This is leading to a trend to embed risk awareness and management across all institutional activities. As the JISC infoNet toolkit on Risk Management [53] acknowledges this does not mean elimination of risk; rather institutions need to manage the risk through identification, assessment of impact and how it might reasonably be mitigated.

Risk and its effective management will affect all aspects of practice. Pressure to conform to legal requirements and regulations surrounding everything from health & safety through disability discrimination, accessibility to resource usage and carbon emissions are leading institutions to overhaul their practices in order to militate against the various risks and consequences of non-compliance. This could include mandating lower risk working practices as well as instilling in staff a sense of personal responsibility for their own practice and how it affects others.

For senior management and institutional planners, benchmarking of performance against comparative or aspirational institutions is important to maintain success and competitive advantage. Quality monitoring requirements are therefore adding to everyday tasks. Identifying and monitoring of key performance measures relating to services and staff will become increasingly important, leading to increased data gathering and analysis requirements for many staff. For example, the mandatory QAA's Enhancement-Led Institutional Review (ELIR) [54] is one of five main elements of a new approach to quality in Scotland. These reviews require Scottish institutions to establish guidelines for staff to ensure they fully understand the implications of quality measures and to take individual responsibility to ensure that their institution performs well under scrutiny. Preparing for, and indeed learning from, quality reviews has become part of most if not all institutional strategic planning across HE and FE involving central administrators, faculties and individual academics. Institutions will also increasingly focus staff's attention on ensuring good results in the annual National Student Survey (NSS) [33], HESA returns [55] and other measures that influence the standing and status of institutions national league tables such as The Times' 'Good University Guide' or The Guardian's 'University Guide'. Poor results not only impact upon student recruitment and retention, but also industry links, global partnerships and indeed staff recruitment and retention as stakeholders base their associations with institutions upon recognised and visible markers of success. The onus on achieving good results requires academic staff to explore the complex causality behind student opinion, taking time away from teaching and research activities.

The focus on risk management may lead to some tensions for staff. For example, as institutions increasingly develop strategic approaches to how their research profile is presented to maximise possible Research Excellence Framework (REF) ratings, some staff may be omitted from the institutional returns. This could have a significant negative impact on their career. On the other hand as was noted in the e-Research case study, "research success and reputation affords you a lot more flexibility in your working practices" [56]. The amount of data gathering can be viewed as excessively high by academic staff; however, when intelligently aligned with institutional priorities this can also aid staff. For example, the information canvassed from student feedback on courses for quality reports can help staff redesign more effective learning experiences which relieve bottlenecks and the workload associated with underperforming students.

Possible Risk-related roles:

Reflective Translators & Practitioners: A role that should exist within departments and faculties to reflect on institutional ethos and strategy and ensure risk and quality remain at the forefront of “on the ground” activities and how these impact upon individual working practices, ethics and staff development/training. Key skills: knowledge of strategic approaches and pedagogical excellence; ability to translate strategic objectives into tangible activities for departments and faculties and suggest methods for middle managers to integrate this into individual staff working practices and approaches.

Risk assessors: A role that horizon scans and analyses current and emerging trends to help institutions determine their biggest risks and challenges. Key skills: Project management, strategic planning, measuring, benchmarking and translating results for Senior managers.

Quality Evaluators & Monitors: A role that surrounds helping the institution to prepare for external reviews and monitors the translation of these into measures of “quality” within institutions. Key skills: Awareness of external factors and internal marketing strategies; ability to translate reviews into real tasks for institutions going forward to improve quality and ensure risks are addressed and mitigated against; evaluation skills to monitor success and quality targets.

Formal Programme Office: A number of roles relating to the formal management of the portfolio of strategic institutional projects are likely to become increasingly prominent. Individual project managers will require to skills in formal methodologies such as Prince II as well as good communication skills. Programme managers will additionally need to be able to appropriately select, combine and refine outputs of a range of projects to realise the strategic outcomes sought by an institution

5.3 Reflections of the PESTLE analysis

The PES(T)LE investigation process, key factors and trends and the principle implications staff and institutions of changing PESTLE influences are discussed below.

a) *The PES(T)LE investigation process*

PESTLE analysis is by nature an exploratory tool designed to help identify key influences from the external environment which may impact upon an organisation. It does not provide a definitive answer regarding what will happen; rather it identifies potential key influences, which in this case were then used to explore three key trends which might affect HE and FE institutions in over the next five years.

The actual PES(T)LE analysis process proved challenging. Firstly, it is difficult to attribute the influences identified to particular PESTLE dimensions and even more challenging to attribute effects to specific factor/causes due to complexity. As the project workshops and Work-with-IT case studies illustrated, each factor could often be considered under a number

of different headings and this underlines the importance of considering each area as a group of intertwined issues. Some participants noted that it seemed easier to identify key trends and then work back to PESTLE factors and that it is the interaction of a number of different PESTLE factors which will in fact lead to changes in working practices. Secondly, this complexity combined with some participants' time constraints and lack of familiarity with the PESTLE process and/or background details means that the depth of analysis for each case study varies. Finally, as technology now plays such a major role in daily lives, it was impossible to confine discussion to the non-technological PESTLE dimensions.

The general outputs of the PES(T)LE investigation described above and the individual case study analyses on the Work-with-IT website provide a rich perspective on the non-technological factors that may influence institutions and indeed the case studies over the next five years. This perspective is of course influenced by the individual perceptions of participants, which in turn is shaped by their roles, responsibilities and institutional culture. For different institutions and individuals, opinions surrounding the factor categories and the perceived degree of importance of each PESTLE dimension and the influences identified may vary. For example, in some areas there were distinct differences between HE and FE views of the relative importance of the various PES(T)LE factors. Finally, whether some of the factors identified are in fact a result of post-rationalisation rather than actual inferences must also be questioned.

b) Key factors and trends

As subsection 5.1 illustrates a wide variety of factors are likely to affect the sector over the next five years. Table 2 below highlights the key PESTLE factors identified in the investigation from the range of factors discussed in subsection 5.1. Factors in bold were rated highest by the participants, with un-bolded factors being second highest.

PESTLE Dimension	Most significant factors over next five years
Political	Potential change of government Lifelong Learning policies Knowledge exchange polices
Economic	Recession Maintaining competitive advantage Knowledge Exchange
Social	Social Networks and Communities of Practice Culture Changing demographics
Technological	Web 2.0 Availability of technological solutions

PESTLE Dimension	Most significant factors over next five years
Legal	Compliance issues relating to copyright, IPR, data protection, health & safety discrimination and human rights
Environmental	Availability and fitness of estate Green agenda

Table 2: Key PESTLE factors identified by the PESTLE investigation participants

The three trends – *lean thinking*, *flexible learning* and *risk management* – together with a trend towards *collaboration & sharing*, discussed in section 6 highlight a variety of key changes to institutional priorities and working practices that may arise in the sector in the next five years. Indeed, some are already in evidence. All three of the trends discussed here are top-down trends – institutional as opposed to individual responses to the external environment, while collaboration & sharing is much more bottom-up, emerging from individual members of staff.

These trends will also be interrelated to the technology-enhanced working trends discussed in section 2. In reality, institutions may adopt facets from each of the trends; however the trends provide a flavour of the kinds of changes and issues which may arise and as such will provide useful input into institutional planning exercises as will the earlier discussion of PES(T)LE factors.

c) Implications

(i) For changing roles

If efficiencies are to be made while quality is maintained and improved, staff roles are likely to become more well-defined, with an emphasis on key performance indicators, clearly identified responsibilities and alignment with institutional strategy. Roles may change or be discarded in order to ensure leanness of operations; however some new roles may emerge – mainly surrounding the co-ordination and negotiation of resources and quality/risk assessment and management. On the whole the increasing trend towards individual responsibility and accountability with regard to working practices will increase the tasks and responsibilities associated with roles.

Demand for office space and moves towards more service-orientated and consumer driven service provision may demand an increase in flexible working, through non-standard hours or off-campus locations. While this may coincide with staff desires for more flexible working, institutions will need to approach flexible working carefully to ensure staff are on board and compliant with legal regulations.

(ii) For staff development

As staff will need to align their practices with strategic direction and quality and risk management procedures, they will require increasingly to reflect on their practice and how it

affects others as well as gather and analyse performance evidence. For many groups of staff this will be a new demand. If these new practices are not to become counterproductive – e.g. gathering statistics for statistics sake – then staff development will need to focus on team development planning and developing reflective and strategically aware practitioners across all categories of staff.

Staff development offerings will also need to be increasingly aligned with an institutions strategic focus. This is likely to result in a focus on training and development relating to approved core services and working practices at the expense of training in non-standard technologies or working practices.

Coping with relationships that are non-traditional will also be a major implication for staff as they are likely to work with staff and indeed students across a number of localities, time-zones, and physical and virtual spaces. For example, staff that are geographically disparate from other colleagues or indeed their student base will need to become involved in communities of practice and this could result in skills gaps that require new training.

Some of the challenges for staff with regard to skills and relationships are still unknown and lack of horizon scanning and strategic planning around these issues could have serious implications for staff development.

(iii) For institutions

As the three key trends illustrate, financial constraints, consumer (student) trends and risk management are likely to dominate institutional thinking over the next five years, necessitating top-down led changes to institutional focus and working practices. The resulting change in working practice and attitudes required of staff if these institutional moves are to be effective necessitate clear strategic direction and strong leadership. Additionally, where increased flexibility is required, institutions need to provide clear guidance on where staff, working practices and initiatives fit in the bigger institutional picture and how they contribute to success. Further, while many of the changes will be designed to save costs, to be effective institutions will need to invest sufficient resource and funding to address the impact upon staff, working practices and the resulting skills development requirements.

Increased regulation and managing the threat of litigation will have major implications for institutions going forward. Compliance strategies and protocols will have to be developed in new areas such as Quality Assurance and Location Independent Working. Measuring quality and excellence is challenging and institutions need to make clearer links between strategic targets and actual working practices. Increased bureaucracy and red tape will need to be appropriately managed to prevent educational experience or service from suffering because rules dictate. Providing flexible working and learning will also impact upon institutions as they must provide the appropriate “duty of care” for staff and students alike and this may require greater investment in infrastructure and staff development to create the appropriate working environment.

Finally, while many institutions increasingly recognise the importance of horizon scanning and institutional planning at a strategic level, it will be important to ensure that ground-up

Project Acronym: Work-with-IT

Version:2.0

Contact: Diane.McDonald@strath.ac.uk

Date: 13/03/09

innovations are still encouraged and nurtured, where in line with the institutions strategic direction. However, the move towards lean thinking etc and the resulting focus of roles could be to the detriment of innovation and this was expressed as a particular concern within the PES(T)LE investigation. It is therefore recommended that institutions ensure that mechanisms are developed to support horizon scanning and bottom-up innovation across all categories of staff, aligned to institutional strategy and sensitive to wider external factors and trends.

6 The effect of Web 2.0

As JISC's 2007 TechWatch review of the ideas, technologies and implications for education of Web 2.0 [9] highlighted, the emergence of Web 2.0 provides significant challenges for the academic sector. The six big ideas of Web 2.0 – individual production and user-generated content, harnessing the power of the crowd, data on an epic scale, architecture of participation network effects and openness [9]⁹ – offer new ways to interact with people and information, suggesting that their adoption within HE and FE may result in a radical change to working practices and relationships. The ease with which individuals can adopt and adapt Web 2.0 technologies¹⁰, cross-linking to differing resources and people, without any central control makes them emergent in nature. This results in an inherent unpredictability, where their use evolves over time, making it difficult to identify the full range of their potential and the resulting implications for staff and institutions.

At the time of commissioning of the first phase of the Work-with-IT project in early 2008, the use of Web 2.0 technologies within HE and FE was still very much in its infancy with some early adopters focussed mainly within particular subject areas or research domains [58]. Further, as the JISC TechWatch report noted, there was still significant debate regarding the advantages and disadvantages of incorporating Web 2.0 technologies into academia [9]. This meant that there was insufficient evidence base within the sector to identify general trends regarding working practices or the implications for staff attitudes, roles responsibilities and relationships. By October 2009 however, it was felt that there was sufficient experience of the practical use of Web 2.0 within a range of activities across the sector to warrant a Web 2.0 specific review to be undertaken to examine the evolution of working practices and staff attitudes, and the resulting impact on staff roles, responsibilities and relationships across the sector. This section presents the results of the review.

The review consisted of desk research and a series of activity interviews with key stakeholders – projects, institutions and relevant experts – to explore: the impact that Web 2.0 technologies are having on working practices and staff roles and responsibilities; the skills required; and drivers for uptake. Further, due to the emergent nature of the technologies and related factors the review also included reflection on the potential uses and future impact of Web 2.0 technologies on HE and FE in the short to medium term. Given the constantly evolving nature of what is termed Web 2.0, the project did not use a particular definition of Web 2.0 or specify particular technologies; rather the approach adopted was to allow the stakeholders to provide meaning within their own specific context. Key stakeholders were identified through utilising appropriate mailing lists, contacting professional bodies and capitalising on the project team's existing network of contacts. The activity review was split into four – learning and teaching, research, administration and

⁹ Based on the seminal paper of O'Reilly [57] who attempted to identify the core features of Web 2.0 from a technology business perspective

¹⁰ As the JISC TechWatch report on Web 2.0 argues, Web 2.0 is a set of six big ideas rather than technologies per se [9]. However, the term 'Web 2.0 technologies' is used within this report to refer to Web technologies which facilitate these big ideas.

professional services and library. The results of the activity review and the methodology used are presented in full on the project website – <http://ewds.strath.ac.uk/work-with-it>.

The remainder of this section synthesises the results of these four areas under review. First, in subsection 6.1, a brief overview of Web 2.0 related working practices is provided. This is followed, in subsection 6.2, by a summary of the resulting changes to roles, responsibilities and relationships. Next, in subsection 6.3, skills and competency requirements are summarised and training needs discussed. Subsection 6.4 then considers the various drivers which specifically affect the uptake of Web 2.0 technologies. Attention is then turned, in subsection 6.5, to the potential future use and impact of Web 2.0 technologies on the sector. The section ends, in 6.5, by drawing some conclusions and reflections regarding the impact of Web 2.0 technologies.

6.1 Changing working practices

Web founder Sir Tim Berners-Lee argues that Web 2.0 is nothing new as the Web was founded to support a global, collaborative information space, connecting people [59, cited in 9]. In a similar vein, many of the six big ideas of Web 2.0 – individual production and user-generated content, harnessing the power of the crowd, data on an epic scale, architecture of participation, network effects and openness – are inherent in traditional academic practice. For example, the social interaction and collaboration inherent in Web 2.0 is fundamental to constructivist approaches to learning [60]. Similarly, Stewart [61] argues, Web 2.0 supports communication and information practices which were traditionally characteristic of scholarly communication, although these have somewhat ossified since Darwin's times. However the immediacy and global extent of interaction combined with the ability to cross-link to differing does potentially change the working practices within institutions.

In line with the findings of 'Committee of Enquiry into impact on higher education of students' widespread use of Web 2.0 technologies' [34], the activity review found evidence of Web 2.0 technologies being employed across a broad spectrum on institutional activities. However, uptake depends to a large extent on synergy with the task at hand and governance requirements.

a) Learning and Teaching

Learning and teaching in HE and FE is constantly evolving to keep pace with new approaches and to maximise the student experience and expectations. Web 2.0 technologies have afforded many new opportunities and academics are usually open to trying new things or new ways of working. Often this tendency towards innovation "comes from a need to do things better" [62]. This has impacted upon day to day working practices in a number of different ways with some staff reporting that Web 2.0 technologies have completely changed the way they approach their day to day tasks. Some academics also feel the ability to innovate is a prerequisite to the role of staff associated with learning and teaching and that Web 2.0 technologies fit particularly well with Constructivist Pedagogy [60].

Lecturing staff are now using technologies such as Wikis, Blogs, Podcasts and Twitter [63] to create “virtual” learning spaces that either supplement traditional face-to-face methods or in some cases completely replace previous ways of working and communicating.

Lectures are no longer prepared or indeed delivered in the same way because of Web 2.0. She comments “teaching and supporting students is our business and doesn't change but the way we go about this day to day has changed considerably”

Liz Bennett, Senior Lecturer, University of Huddersfield

While some staff have the formal support of their institutions to do this through provision of an appropriate environment and through training and development programmes and activities, in others support is often lacking. In such cases, responsibility has fallen to a few interested individuals who struggle to find the time to promote technology use and indeed integrate new Web 2.0 related working practices into their existing duties.

Further, technology is often used to direct or indeed re-direct communications between staff and students and Web 2.0 has afforded a number of new avenues in which communication can be facilitated. “Powerful and varied lectures can be achieved easily through using Web 2.0 technology” [64] and the new opportunities for interaction with students allow staff to create learning spaces beyond that of the traditional classroom and indeed impact upon associated working practices surrounding communication and information sharing.

The **University College Plymouth** has invested in *Campus Pack* [2], an education specific Web 2.0 platform that allows the integration of wikis, blogs, podcasts etc. with existing on-line learning environments. The Blog features available through Campus Pack have proved excellent for teacher trainee placement journals. They allow students to update tutors weekly with their progress attaching relevant files for comment and feedback (e.g. lesson plans). Blogs also allow students and staff to reflect on lessons and progress. RSS feeds are used to save time and provide more frequent information. Prior to Web 2.0, school placements “were a nightmare for tutors, including keeping track of emails, downloading documents and filing etc.” As a result of the introduction of these podcasting tools, more staff are experimenting with audio/video and academic staff have more time for research and can keep track of student work more easily. In this case working practices have become more streamlined as Web 2.0 has reduced time on task and minimised associated administrative tasks.

Adam Read, Learning Technologist, University College Plymouth

b) Research

Web 2.0 technologies are also increasingly used to support and conduct research. For example, Open Notebooks such as myExperiment [65] are used to share research data and collaboratively solve research problems [66] and Virtual Research Environments (VREs) increasingly integrate a range of Web 2.0 technologies. As the activity reviews revealed, for

some there has been a fundamental shift from using technologies such as email and traditional web sites to aid contact, to using Web 2.0 technologies for productive research [6, 67-68].

Cloudworks [3] is a social networking site which has been developed by the **Open University** to create an evolving, dynamic community of users, tools, resources, ideas and experiences associated with learning design. Cloudworks is used as both a staff development and a research tool and is used by Open University staff and external parties. The Cloudworks project team encourage participation from the wider Web 2.0 community and provide deliberate links to other technologies such as Twitter and personal blogs.

Often, a range of Web 2.0 technologies are used by individual researchers or research teams, with particular technologies being employed for different purposes. For example, Twitter may be used to spark interest in a topic, starting a viral debate. More detailed discussions may then move to a discussion forum where issues can be collectively explored in depth. Information from multiple sources may be usefully aggregated. Individual academics may then present their synthesis of the emerging ideas through personal Blogs or collaborative outputs may be generated through Wikis. Thus, for such researchers, the developing research may flow between multiple media.

The use of institutional-based and external Wikis and Blogs has proven a useful means of bringing together demographically dispersed teams – especially when other tools such as Skype [69] have proved ineffective when collaborators are from different time zones. Although these tools are extremely useful, they are heavily reliant upon active participation and anecdotal evidence shows that they are only as strong as the “community” that backs them. It can prove very difficult to build a community using these tools, although it is an excellent way of facilitating better communication and collaboration within a community that is already established.

A recent project used a Wiki for a book proposal with academic collaborators from all over the world. The project was run completely through the institutional Wiki, which facilitated a democratic process in an effective way, with everyone in the project team able to contribute and comment. It was the technology itself that made this collaboration possible – without it, the process would have been far more cumbersome and less collaborative if the proposal had been put together through phone calls or emails. However, the power of face-to-face meetings should not be forgotten, since they help to build upon relationships being established by Web 2.0 technologies. It is the combination of the two approaches that seems to work best as demonstrated by the “flurry of activity on the Wiki” after a face-to-face meeting, as people continued to discuss points that had been raised.

Margo Blythman, University of Arts

Project Acronym: Work-with-IT

Version:2.0

Contact: Diane.McDonald@strath.ac.uk

Date: 13/03/09

For researchers who have successfully engaged with Web 2.0 technologies, their use is now fully embedded within their daily working practices.

The advantages afforded by Web 2.0 technologies means that Twitter and Cloudworks are now embedded in everyday working practices and have become a key tool in professional development.

Grainne Conole & Rebecca Galley, Open University

c) Administration and professional services

Administration and Professional Services within HE and FE institutions are traditionally underpinned by well-defined corporate IT systems, designed to ensure good governance and stewardship of an institution's business assets. However, there is increasing uptake in the use of collaborative software to aid project management and collaborative working.

Staff from differing professional services departments are using the institution's SharePoint [1] service to manage the Principles in Patterns project [8], part of JISC's Institutional Approaches to Curriculum Design Programme.

Further, a new collaborative site has been set up as a forum for project managers to get to know each other and begin to identify shared issues and concerns. This site also presents the institution's formal project management methodology and related templates to help staff use a consistent methodology for managing projects, based on best practice within and beyond the institution.

University of Strathclyde

Professional services staff are also adopting Web 2.0 technologies to deal with ever increasing workloads and the need to keep up with developments in their fields.

Steffan Jones Hughes, a co-ordinator at the Regional Print Centre based at **Yale College**, has attempted to merge old and new working practices to manage time burdens. He sets aside a time every day to update Blogs, Facebook and other sites, deliberately aligning this with the time he spends checking and replying to emails. He uses Web 2.0 tools for both supporting students and those interested in the print unit's services and to support his administrative duties e.g. using Facebook as a record of work activity and events. His overall duties are mostly unchanged but his approach to his day to day work load and tasks has been considerably affected by the introduction of Web 2.0 and aligning new Web 2.0 tasks with more traditional activities has altered his working practices while allowing him to maintain control over his day to day workload.

On the other hand, the review indicated that aspects such as student records and financial systems remain firmly tied to traditional corporate information systems applications. Given

the openness and architecture of participation inherent in Web 2.0 [9], whether the Web 2.0 will or indeed should ever be used as the basis for such corporate applications must be questioned.

However, some less general professional services functions are also being affected by the emergence of Web 2.0 technologies. An illustrative example of this is the impact that Web 2.0 technologies are having on alumni services within institutions. Here, communication with students and former students and marketing of alumni services both internally and externally is evolving, due in large measure to the emergence of social networking sites such as Facebook [70] and LinkedIn [71].

In many institutions, alumni staff regularly use Facebook and LinkedIn to communicate with alumni. Anecdotal evidence from activity reviews suggests that these technologies have helped establish a more personal relationship between former students and alumni staff and have proved an excellent method of disseminating information and communicating in a more useful way with both graduates and undergraduates.

As Lavrusik's [72] survey highlights, Web 2.0 is now being employed to: help alumni find jobs; collaborate and connect with students; fundraising; train alumni to use social media; meet alumni where 'they're at'; spread information; facilitate alumni-generated content; promote alumni networks; facilitate reunions. This adoption of Web 2.0 technologies is also changing the working practices of alumni staff.

d) Libraries

Web 2.0 technologies are also being adopted by library staff.

In the National Library of Wales, a number of teams use a micro blogging tool (not twitter) called Yammer to communicate, mostly about what they are doing to each other. Using this service has proved useful and there is a "critical mass" that is reached where it is easier to be part of this than not.

Paul Bevan, Head of ICT, National Library of Wales

One of the main impacts on library staff using social networking applications is the need to allocate and manage the time involved in providing services. Contributors to library services feel that they have taken on extra work (e.g. contributing to blogs) and that unofficially they are spending time on these, and some people will find the time and others will struggle. It was noted by some respondents that there are dangers that staff can become obsessed with using one particular application (Facebook, Twitter) and a balance is needed in using old versus new technologies. The need to assess new technologies and their possible use within a library places demands on the service by requiring time and expertise from an already busy service.

6.2 Changing roles, responsibilities and relationships

a) *Evolution of roles and responsibilities*

In general, Web 2.0 technologies are facilitating an evolution of existing roles rather than development of new roles. For example, additional responsibilities such as monitoring of tweets, blogs or social network discussions are being subsumed into everyday working practices of academics, researchers and professional staff. In some areas, these additional responsibilities are formalised.

At the **University of Strathclyde** the use of Web 2.0 is now written into the alumni officer Job Description. The person specification now stipulates that social networking experience with the ability to further develop as technology progresses is an “essential” part of the job.

Lucy Alder, Alumni Officer, University of Strathclyde

The trend at some American and Canadian universities, where there are massive provisions for managing alumni relations with Web 2.0, is for dedicated technology-related staff to support those communications [73]. Similarly, new technology roles within Alumni Offices may also appear in the UK sector over time.

Some new roles are already in evidence. For example, where Web 2.0 technologies are an integral part of the research, new roles are emerging which focus on identifying, articulating and giving meaning to emergent patterns within social sites. This ‘eMediator’ responsibility goes beyond the typical facilitator role found within more traditional Communities of Practice.

Rebecca Galley was employed as a Curriculum Design Project Officer within the Institute of Educational Technology, specifically to work on the OU’s Open University Learning Design Initiative – OULDI [4] – which aims to develop and implement a methodology for learning design composed of tools, practice and other innovation that both builds upon, and contributes to, existing academic and practitioner research. While Rebecca previously did not use Web 2.0 at work, it was made clear that for this post Web 2.0 usage was non-negotiable. As part of her job, Rebecca supports people to use Cloudworks [4]. This includes both more traditional activities such as providing on-line advice, running workshops, evaluating use and more Web 2.0 related activities such as identifying emerging patterns in the discourse, priming discussions with provocative questions and capturing emerging etiquette and good practice. She has also taken on some associated development activities that show a change in direction for her from previous activities.

Rebecca Galley, Curriculum Design Project Officer, Open University

The role of eEditor is another interesting role that has changed as a result of the increasing role of Web 2.0 technologies. This role surrounds the provision of specialised support and advice relating to Web content – it is not the same as the role of a “moderator” as they do

not necessarily monitor content with a view to removing anything inappropriate. Their role is more about providing information and support prior to information being made available online.

The eEditor at the National Library of Wales includes “responsibility for all of the library’s online presence... acting as a co-coordinator (nexus) for all the work done on the web site, as a supporting role and someone who can give advice [on Web 2.0 and other related areas]”.

Paul Bevan, Head of ICT, National Library of Wales

For the majority of staff who took part in the activity review, Web 2.0 technologies are changing their working practices and relationships rather than their roles per se. While most staff interviewed in the activity review believe formal changes to roles and job descriptions are not necessary, formal recognition of their changing working practices and the time and support network required to become proficient in the various emerging technologies was viewed as important.

“More formal recognition of how these technologies work and the time they can take - built into a role would help.”

Steffan Jones Hughes, Co-ordinator, Regional Print Centre, Yale College

b) Changing relationships

The social and collaborative nature of Web 2.0 technologies is resulting in a significant change in relationships. Communication via email is being supplemented or in some cases replaced by social forums, twitter, texts and blogs etc. The open and more informal nature of Web 2.0 technologies invites collaboration and much wider interaction than that afforded by more traditional communication channels, significantly changing relationships in all areas of academia. Web 2.0 also helps to facilitate geographically disperse communities of practice allowing international communities to be established and cross-boundary working to be a more feasible option.

While there has already been a significant move towards collaboration in recent years at least – be it in student learning, research or professional services – Web 2.0 technologies are significantly changing the extent, timing and nature of this collaboration. For example, Web 2.0 based research networks provide new researchers with a more readily accessible platform for discussing emerging research with leading researchers in their field, with the social nature potentially helping to develop deeper relationships [68]. Some established researchers are also significantly changing how they relate to their disciplinary community by using collaborative sites to gain peer input on developing academic papers. This exposure of developing ideas to wide and open peer review is a fundamental change in working practices. For those who embrace what Greenhow [74] terms “social scholarship”, the experience can be powerful, fundamentally changing how they develop academic papers.

“If you would have said to me five years ago that I would have put a kind of half-baked draft of a paper up, publically available for anyone to look at, I wouldn't have dreamed of doing it because it would have been, I felt, professional suicide whereas I do it routinely now because you know you can put in caveats and draft and you can get instant feedback, detailed feedback on draft papers from people in America within two hours – a level of kind of engagement that you wouldn't have go elsewhere. [As a result], I've become more and more convinced of the benefit of openness. [...] I have become more and more open to the extent that I am now heading up a new research programme within the OU to do with learning in an open world.”

Grainne Conole, Professor of e-learning, Open University

For others, such open publishing undermines the long established professional peer review process associated with academic journals which has been a key part of the quality assurance of research. This more egalitarian approach which Web 2.0 technologies afford, combined with a lack of familiarity with the technologies can result in academics feeling “doubly disempowered” [7] and is significantly challenging traditional novice-expert relationships.

In teaching and learning, the relationship between student and lecturer and the form of teaching and learning is changing.

“The teaching area is now broader and wider and boundaries are being broken down. Text messages are replacing email” and the ways in which staff communicate with students is changing. The traditional student/teacher relationship is evolving as a result. Teaching now has a more informal edge and it is possible to break down previous scepticism about Web 2.0 as the successful impact of the technology is revealed.

**Kenneth Park, Senior Lecturer & Seconded Learning Technologist,
Cardonald College**

Relationships are also extending beyond traditional boundaries as staff, be it lecturers or administrators, seek to meet students in their own social spaces.

At the **University of Huddersfield** Web 2.0 is being used not only as part of the content of the MSc in Multimedia and E-learning but as a method of building a community of practice and fostering better relations between staff and students both before and during the course. Web 2.0 technologies have proved an ideal method to supplement limited face-to-face teaching time, enabling the lecturer to make the course more dynamic, lively and accessible and other lecturers are starting to copy this example.

Use of these technologies helps lecturing staff better foster and manage relationships with students where face-to-face time is limited – *“[it] was easier to put a face to a name as I could cross-reference with the social networking spaces”*.

Liz Bennet, Senior Lecturer, University of Huddersfield

Web 2.0 technologies are extending these relationships beyond a student's time at university or college as institutions increasingly market to prospective students and alumni via Facebook or LinkedIn. This raises issues for staff in terms of their potential lack of expertise with Web 2.0 technologies and particularly social networking sites, reversing the novice-expertise relationship which traditionally exists between staff and students. Further, etiquette is still evolving regarding how best or indeed whether it is beneficial to meet students (prospective and past) in their own social spaces.

Social networking sites such as Facebook have policies discouraging the creation of multiple profiles, yet if staff wish to use these sites in both their work and private life, a single profile will undoubtedly lead to tension and even pressure to reveal more about themselves to a particular audience than they in fact feel comfortable with. As the activity review revealed, some staff defy this policy and create separate profiles in order to maintain public and private boundaries.

The success of Blogs and collaborative tools such as Wikis depend primarily on individual personalised contributions. Non-personalised project Blogs simply do not appear as effective as those from a recognised individual [68]. This increasing exposure of individuals through their personal work contributions combined with the blurring of boundaries between work and social use also leads to a blurring of work and social identities. It was suggested in the activity review that institutions should be encouraging staff to conform to more formal (i.e. prescriptive) institutional identities while working online in order to ensure that the voice of the institution is properly represented and to help staff negotiate this tricky issue. While some advice and guidance would undoubtedly be welcomed, such a prescriptive and impersonal approach misses the point and is likely to fail to deliver the advantages that social technologies offer. Instead, staff need to be aware that the openness of the Web and the ability to aggregate contributions means that even when they try to split work and social use, their personas will leak across. Staff need to consider carefully the implications of their postings and ensure professional conduct across both work and social use.

Web 2.0 technologies support a range of interactions and degrees of participation. Activities range from simple publishing through discussion with others to collaborative activities. Different tools are used depending on purpose. As with Communities of Practice in general, participation varies from lurkers who monitor activity without contributing to expert participants who actively engage in discussion and/or publishing.

Finally, the aggregation and interconnectivity afforded by Web 2.0 technologies are leading to a “distributed me” [6] which is radically changing how we present and how others interact with our work. For example, a researcher’s research data, developments and outputs are increasingly stored, published and cross-referenced across multiple sites. While this affords increased exposure in multiple forums and differing communities, managing the content becomes increasingly difficult. For example, developing ideas subsequently discarded may still be exposed through Blog postings etc.

6.3 Skills and Competencies

Staff have differing levels of skills and confidence relating to Web 2.0 technologies.

Although “relationships between staff are still based predominately on email” some younger staff are beginning to communicate unofficially through social networking sites and the concept of Web 2.0 is definitely a more “comfortable” topic. Staff at the college are becoming more confident with technologies such as YouTube and Wikipedia and there is a good proportion of staff using these technologies in their every day working practices. It is expected this use will increase in the next five years and as an institution we are now “working furiously to develop content that will fit this mode of delivery – further Web 2.0 content and mobile delivery”.

**Kenneth Park, Senior Lecturer & Seconded Learning Technologist,
Cardonald College**

The skills and competency issues for staff relating to working with Web 2.0 technologies are primarily ‘soft-skills’ issues.

Perhaps most importantly, while Web 2.0 technologies are generally easy to use, it can be cognitively difficult to grasp how to use them effectively. For example, to reap the benefits from embedding use of Web 2.0 technologies in working practices, individuals may need to go through an almost transformational change [6]. Core to success is understanding the cross-links afforded by such technologies and how to make best use of them. For example, novice users tend to ask ‘Google type questions’ such as ‘what is ...’ rather than Web 2.0 type questions regarding connections and links [6]. The degree of connectivity brings with it an additional dimension of complexity. Even technically easy to use technologies like Twitter can be cognitively challenging [6]. Further, only participants who can identify emergent patterns arising from the Web 2.0 based discourses will be able to leverage the ‘collective intelligence’ capabilities of these technologies.

Understanding social interaction is also key to effective practice using Web 2.0 technologies. For example, to use social networking sites effectively, participants need to frame their

questions in a way that will engage the community and elicit useful responses. Further, given the extent of virtual collaborations and the wide range of people, perhaps with differing contexts, who may view and participate in discussions, identifying, assessing and managing how comments and interactions may be interpreted – i.e. emotional intelligence – is key. While some staff understand social and group interactions well and have already embedded good practice in this area, for others the group and social networking skills required for Web 2.0 technologies do not come so readily [7].

A feeling of uncertainty and discomfort may be compounded by confrontation with unfamiliar technology and indeed the different types of questions and content inherent in Web 2.0 discourse.

Activity reviews [6-7]

Further, as we move towards a reality where our working and social lives means membership of multiple Communities of Practice, each potentially with differing cultures, norms and etiquettes this further compounds the difficulties. Particular attention, therefore, needs to be paid to supporting staff to develop the required social networking skills. For staff involved in running rather than simply participating in Web 2.0 forums, understanding how to develop, facilitate and manage groups will be key. This applies equally to academics using social forums with students, researchers developing networks relating to particular foci and the running of forums to support entrepreneurial or alumni activities.

The openness and participative architecture of Web 2.0 potentially exposes staff to a range of issues regarding publishing, aggregation and reuse of material, potentially beyond their original context, using RSS and Mash-ups. Making staff aware of these issues and the JISC Web2Rights project [75] which seeks to help institutions address potential legal penalties for libel, obscenity, data protection infringements will help staff to use the technology appropriately. However, ethical issues also arise.

The openness of collaborative sites also brings ethical dilemmas which individual staff will need the skill to address.

Steven Warburton, King's College London

Exploration of some of the ethical issues such as the potential misrepresentation that may arise through mash-ups or the use of social networks as research foci are perhaps best addressed within the context of professional academic practice staff development.

Staff will require advice on the implications of the blurring of boundaries between their work and private persona, where these personas should be separated and how this might be reasonably achieved. Further, guidance will also be required regarding the implications of their postings for institutional identities and profiles. Additionally, staff will need to be encouraged to self-monitor and maintain the full range of their distributed presence to ensure that postings published as part of developing thoughts, are not being returned by search engines and mash-ups as representing their current position. This will require understanding

of how Web resources can be reused as well as good practice in tagging and annotating postings. Technologies such as FriendFeed [76], which can aggregate all content generating on the web for an individual, may be used to help staff understand the distributed Web profile which they are generating.

Finally, the nature of Web 2.0 technologies means that they have unlimited potential application. For busy staff, identifying appropriate tools from the vast range of potential tools – provided either by the institution or on the Web – is difficult and time consuming. Choice may be affected by the capabilities of individual Web 2.0 technologies, the task at hand, prior exposure to particular Web 2.0 offerings and what colleagues and remote collaborators within a given field are already using. Individual staff cannot be expected to be experts in all these areas but they will need to have a broad idea of capabilities and be able to discuss ideas to technical experts. Further, those in horizon scanning and embedding roles will also need to become proficient in matching technology potential with institutional objectives and usefulness to individual practitioners be they academics, researchers or professional services staff. They will also need to be skilled in negotiating the many constraints to embed new technologies and ways of working within institutions.

6.4 Drivers and constraints

The activity review further supports the ‘Committee of Enquiry into impact on higher education of students’ widespread use of Web 2.0 technologies’ [34] findings of a tendency towards “bottom-up” adoption of Web 2.0 technologies within HE and FE. A combination of the pioneering work of a ‘few early evangelical adopters’ in research and support services and the general desire in teaching and learning to improve the student experience while increasing student numbers, has resulted in largely informal experimentation with Web 2.0 technologies across a number of areas of practice. This bottom-up adoption is driven by a wish to be innovative and leading edge combined with the real practical advantages that Web 2.0 technologies can deliver.

a) *Personal benefit*

The direct personal benefit and practical advantages that the core facilities inherent in Web 2.0 technologies deliver, combined in many instances with staff’s own recreational experience of social networking sites, are key drivers. The social and collaborative functionality provided by many Web 2.0 technologies have been at the core of adoption. As research councils, pedagogues and business experts continue to advocate the benefits of collaboration and Communities of Practice this is likely to remain a key driver for use of tools such as Wikis and Social Networks across all aspects of HE and FE in the medium term.

The ability to aggregate content from multiple sources is a key advantage of Web 2.0 over more traditional technologies. As the amount of online content increases, this ability to aggregate and analyse content pertaining to particular tags will become vital if complexity is to be reduced and advantage is to be taken of the collective intelligence emerging from web 2.0 based interactions.

The advantages afforded by Web 2.0 technologies means that Twitter and Cloudworks are now embedded in everyday working practices and have become a key tool in professional development.

Grainne Conole & Rebecca Galley, Open University

For many researchers, their Web profile and visibility is increasingly important. Web 2.0 technologies such as Blogs, Twitter and Social Networks such as LinkedIn offer significant advantages over traditional Web sites through ease of publication and interconnectivity with others. The Research Excellence Framework, in particular, may be a significant driver in the future, encouraging researchers to embrace Web 2.0 technologies in order to present up to date research profiles, aggregated from content distributed across multiple sites [68].

b) *Student satisfaction*

Student satisfaction is undoubtedly a major driver for smaller institutions, especially FE colleges. In some cases, student preferences may be the prime motivator for adoption of Web 2.0 technologies.

“The internal market decides on the route this institution takes - if the students rate it then it stays. There is less academic justification required [for the introduction of Web 2.0] because of the nature of the services and delivery of learning provided here”

Kenneth Park, Cardonald College

Expectations of an institution being “up to date” – i.e. in line with student expectations and sector trends – can also drive strategic change. For example, some of the smaller institutions and organisations with the activity review have focussed on the use of Web 2.0 as a means of keeping pace with trends within the sector.

The National Library of Wales was concerned that they “may be missing out on something [Web 2.0] and discussions contributed to a strategic review.” This then led to the “appointment of a six month dedicated post to research information delivered via the web, particularly Web 2.0 in current practice”. This more “top down” approach has had an impact upon organisational culture and has changed the idea of what staff can and cannot do – e.g. protocol for posting on blogs and using social networking sites is becoming clearer.

Paul Bevan, Head of ICT, National Library of Wales

However, as the ‘Higher Education in a Web 2.0 world’ report [34] warns, students are still looking for a traditional, high-quality education experience based to a large degree on face-to-face contact and not necessarily a Web 2.0 based one. While the case for using Web 2.0 for student communication increasingly appears sound and in line with constructivist pedagogical approaches, caution is required and much work still needs to be undertaken to establish when Web 2.0 technologies deliver real benefits within the curriculum. For

example, whether the so called VLE 2.0 is based on Web 2.0 technologies or whether it integrates their limited but appropriate use within a wider pedagogical framework is the subject of much discussion [68].

c) Meeting people where they are at

The ability to interact with prospective students, alumni or businesses in their own spaces is another key driver as it allows institutions to engage directly with a large number of potential customers to whom they would not otherwise have access. For example, as discussed in subsection 6.1, Alumni Offices are using Facebook and LinkedIn to make contact with alumni in social and business spaces. In a similar vein, many institutions now have an active presence on Facebook and Second Life in order to market themselves and support prospective students in choosing their educational institution. Potential business collaborators are being solicited through professional social networks such as LinkedIn or bespoke business development networks. For example, Leeds University is currently developing a Web 2.0 based entrepreneurial network which supports SMEs to develop their business.

Institutions are also beginning to collaborate with commercial Web 2.0 type services to provide educational services on commercial Web 2.0 networks. For example, a number of institutions now offer access to learning materials through commercial podcast aggregators such as Apple's iTunes U or Google's YouTube U. These services are used to both provide aggregated, authenticated access to an institution's students or to provide samples of learning material to an external audience.

While attempting to meet prospective students and business collaborators in their own spaces provides institutions with a wide potential market and signals understanding of emerging technology, care is required. The social network members may find marketing interventions intrusive – e.g. similar to junk mail intruding into their social space. Also, if the culture, language and norms of the social space are not well understood by the institution and individual staff, any marketing or brokering may end up being counterproductive with prospective contacts being put off and the credibility of the institution technology awareness becoming damaged. Further, given the open, informal nature of such social networks, the information provided by the institution may not be treated with the same degree of authority as information in its prospectus or on its official website. Finally, institutions must accept that it will be impossible to control discussions of the institution on such forums. As Lipka [77] argues institutions "Don't own the conversation any more".

d) Freedom from constraints

A key driver for many is the fact that Web 2.0 technologies can be adopted in addition to, and sometimes in contravention of, institutional ICT systems and policies.

“Free and open source technology and software is perfect for arts and design - the memory demands on the institution would be too great without use of web 2.0 technologies”

Margo Blythman, University of the Arts

From the activity review, it is clear that for many the notion of academic freedom lies at the heart of this adoption [7, 68, 78] as Web 2.0 technologies afford a degree of independence regarding working practices and general approaches to research and teaching and learning.

In a similar vein, the open access movement which provides free online access to the outputs of publicly funded peer reviewed research has also been influential in uptake of Web 2.0. Publishers are also experimenting with open peer review processes [79, cited in 9]. The sharing and reuse of educational content through Creative Commons and similar licences may also be expected to encourage Web 2.0 type aggregation and reuse. Availability, lack of resource and financial considerations rather than academic freedom underpin such moves.

e) Directed funding and leadership

JISC and the funding councils were also identified as significant drivers in the uptake of Web 2.0 and other innovative technologies through their direction, advice and guidance materials and funding initiatives [7, 68, 78]. Many of the activity review participants acknowledged that without such funding and direction much of research and experimentation with Web 2.0 would not be possible. This has been particularly key given the “bottom up” adoption of Web 2.0 technologies has often meant support at an institutional level, especially funding, has been lacking.

Further, the direction and advice and guidance provided by JISC was also identified as beginning to shape more formal responses from institutions to Web 2.0 technologies. In the activity review, institutional responses were much more common in the smaller FE institutions rather than larger and older HE institutions.

FE colleges are beginning to firm up their policies on Web 2.0 and some have established Web 2.0 guidelines and policies particularly with regard to more “public” facing technologies and social networking sites. “These policies often relate to other policies about general web use, personal respect and appropriate behaviour...the institution has been a big mediator and have invested substantially in taking this message [about the use of web 2.0] forward”

Kenneth Park, Cardonald College

However, the organic, open and personalised nature of Web 2.0 technologies perhaps has significant implications for formal institutional approaches and some HE institutions reported that they are approaching “formalising” Web 2.0 with some caution.

Some institutions are also directing their own funding to provide incentives to experiment with Web 2.0. Awards for innovative use of technology in learning and teaching are also becoming more common place. This recognition, however, appears less well developed in other areas of practice, most notably in research.

6.5 Potential future use and impact

A fundamental characteristic of Web 2.0 technologies is their emergent nature which arises from the ease with which individuals can dynamically enter content and connect to others via cross-links. This emergent nature can lead to unplanned connections, relationships and synergies, making it difficult to predict precisely how the technologies themselves and their application will evolve in the future. However, some key trends and potential future uses of Web 2.0 and beyond, and their implications for roles, responsibilities, skills requirements and impact on HE and FE institutions can be identified.

a) Drivers and constraints

The evolution of Web 2.0 technologies will offer new opportunities for business and academic sectors alike. Gartner [80] predicts that Web 2.0 technologies will continue to co-evolve with consumer markets and new lightweight programming models, being significantly influenced by the need to make Web 2.0 technologies safe for enterprise applications. For example, Gartner predicts that convergence of entertainment and consumer electronic is likely to bring about further significant innovation. Thus, Web 3.0 type technologies may be based on 3-D visualisation and the integration of gaming techniques with the Web [9]. Equally, Web 3.0 may draw on applications which leverage the Semantic Web [81], enabling better and automated manipulation of Web documents. However, the ability of the Semantic Web to actually deliver the large-scale, agent-based mediation that was envisaged has been questioned [82]. While progress is now being made on semanticising data, as Hall et al [81] acknowledge, there is no real way of knowing what Web 3.0 applications will be developed and hence their ultimate impact on working practices.

Focussing more specifically on Web 2.0 in the academic sector, as well as the principle drivers for uptake of current Web 2.0 technologies discussed in subsection 6.4, four additional influences are likely to play a key role in adoption of the emerging technologies. Firstly, the increasing availability of mobile Web 2.0 applications and ownership of mobile devices such as smartphones and web-enabled mp3 players are likely to lead to a significant increase in the use of Web 2.0 for mobile learning and working as they provide flexible and timely access to resources, instantaneous communication, portability, active learning experiences and the empowerment and engagement of learners, particularly those in dispersed communities [83]. This trend will, in part at least, be encouraged, by the evolving consumer and branding models of companies such as Apple, who through iTunes U are providing a content aggregation service for podcasts which provides easy but authenticated access to learning materials anytime and anywhere [84].

Secondly, the challenging carbon reduction targets for the academic sectors, currently being set by the government and funding councils, are likely to lead to increased uptake of Web 2.0 technologies. The ability of these technologies to support collaborative working at a distance will be particularly applicable as it should lead to a reduction of travel-related carbon emissions while still enabling social interaction and collaboration. Related to this, conferences which adopt and exploit Web 2.0 and mobile technologies to become what Demsey [85] describes as “amplified conferences” can extend their outreach and influence, and reduce the need for delegates to travel.

Thirdly, there is currently much interest in researching social networks and collaborative working. Improved understanding and theorising on how social networks and group working actually operates using technology together with an evidence base of good practice should encourage more staff to adopt use of Web 2.0 technologies.

Finally, the recently announced government cuts in HE and FE funding are likely to increase institutional focus on streamlined, cost effective ICT and working practices. Moves towards removing duplication and concentrating on core ICT services as opposed to 'nice to haves' are to be expected. This may lead to institutional policies that mean that individual staff will no longer be able to choose at will to adopt their favourite Web 2.0 technology; however, this does not rule out wholesale adoption and promotion of the use of specific Web 2.0 technologies by institutions should they deliver real institutional benefits.[86] Indeed, current trends in the sector towards cloud computing, where elastic computing resources are delivered over the Internet by external service providers, may reduce the real costs associated with Web 2.0 technologies.

b) Working practices

In general, the day-to-day use of Web 2.0 technologies is likely to increase as more members of staff begin to see the personal advantages and as institutions promote, and where relevant roll out, their use. Use will include: supporting teaching and learning; development and support of research collaborations and projects; helping individuals better manage and extract value from increasingly complex information resources and networks; and management of distributed professional profiles of individuals and institutions. This will signal a move from experimentation with Web 2.0 to embedding within day-to-day working practices. For many the increasing expectation that Web 2.0 technologies be used in their day-to-day activities will be challenging. Presenting training in a way that emphasises its normative usage – i.e. that it is not novel or a hurdle to surmount – will help with embedding [87].

Mobile use of web-based applications, be it for teaching and learning or research, is likely to encourage a further move towards 'life without borders'. This, combined with extended use of collaborative and social networking technologies and a move towards interdisciplinarity will increase interaction and collaboration across traditional boundaries. Both personal-work and traditional disciplinary boundaries are likely to become less clear as a result. As FutureLab's report on mobile learning [86] argues, "[a] blended approach to enabling learning with mobile technologies [will be] necessary as successful and engaging activities draw on a number of different theories and practices" – including behaviourist, constructivist, situated, collaborative and informal and lifelong learning activities.

As individuals and institutions move towards embedding Web 2.0 technologies, there is likely to be a renewed emphasis on how to apply these technologies to good pedagogical or research practice. Evolving understanding of theories of pedagogy and group and network interaction, together with development of a supporting evidence base will become increasingly important. This will lead to more finely tuned use which should in turn encourage wider uptake of the technologies as the benefits become clearer and appropriate support provided. Developments such as myExperiment [88-89] and Cloudworks [4], where

Web 2.0 technologies are currently being researched and refined in an action research setting, should help develop this. However it should be noted that as recent overhype of Google Wave illustrates not all Web 2.0 technologies prove successful, at least when first announced [90].

The spread in use of Web 2.0 technologies combined with moves towards open and reusable learning content and open research data and publications should significantly increase the potential for innovation and speed up developments in education and research. For example, Neylon [66] describes how the open publishing of data from chemistry experiments by one group led to another group developing a visualisation, which in turn led to identification of gaps and further exploration of a key but previously hidden group of substances. While this group solution is illustrative of the 'power of the network', harnessing such power in general may prove more difficult in specialised fields given the high percentage of lurkers generally found on social networking sites [66]. Embedding active participation rather than simply browsing (lurking) and ensuring that social networks are sufficiently attractive will be key to success.

Use may also spread to new areas due to the benefits afforded by the technologies. For example, given the need, discussed in subsection 6.3, for staff to develop social networking skills, staff development activities may begin to use Web 2.0 technologies such as Elluminate [91].

c) Roles and responsibilities

Roles are likely to continue to evolve as a result of future Web developments. Staff will increasingly need to have embedded social networking and ICT skills. Some more specialist Web 2.0 type roles are likely to evolve. These will not necessarily be technology based but rather may focus on working with the big six ideas behind Web 2.0 – individual production and user-generated content, harnessing the power of the crowd, data on an epic scale, architecture of participation network effects and openness. Horizon scanning roles which consider emerging practice and eMediator roles which focus on identifying emergent patterns and helping develop meaning within Web 2.0 collaborative space are possible examples. Hybrid roles, spanning technology and disciplinary practice, will continue to evolve, becoming specialist roles in their own right.

6.6 Reflections on the effect of Web 2.0 technologies

The review process, the key changes and, impacts arising from the adoption of Web 2.0 technologies and their implications for staff roles, staff development and institutions in general and how institutions might look to the future are discussed below.

a) The review process

While the existing literature was less rich with regard to the effects of Web 2.0 technologies on working practices, staff roles, responsibilities and relationships, the activity review provided considerable evidence regarding the impact that these technologies are currently having on staff within the sector. The information gathered is much richer than can reasonably be presented here and therefore this report concentrates on key trends and

insights pertaining to the effect of Web 2.0 on working practices and staff rather than details relating more to pedagogy or the technologies themselves. Further, effects true of technology in general are discussed elsewhere in this report and therefore not repeated in this section.

Following the trend towards using Web 2.0 as a research tool, activity interviews and desk research was complemented by using Cloudworks and Twitter to gather opinions and examples regarding the effect that Web 2.0 is having on individuals' working practices, roles, responsibilities and relationships. Cloudworks proved the more successful medium, partly because of the research team's familiarity with it and partly because it affords more detailed discussion.

b) Key changes, impacts and tensions

As the preceding subsections illustrate, the review does lend weight to claims that Web 2.0 technologies are significantly impacting working practices, roles, responsibilities and relationships.

While many ideas behind Web 2.0 fit well with existing pedagogical and academic practice, the openness, architecture of participation and aggregation results in the following broad consequences:

Broad consequences for staff and academic institutions of Web 2.0 technologies

- Staff have more options to work innovatively with technology; however this freedom is countered by the need to take more personal responsibility for the effects of their Web postings and interactions.
- Working with Web 2.0 technologies requires a cognitive shift: from previous technological approaches to social approaches. In particular it requires a shift
 - o by staff from using data as a resource to using networks;
 - o by staff and institutions from trying to control information and activities to leveraging emergence.
- Effective use of Web 2.0 means being part of a crowd; the use of particular Web 2.0 technologies by staff will therefore be dictated by trends within their community.
- The blurring of boundaries between work and social identities is increasing and helping staff find their "voice" within social and collaborative spaces can be troublesome.
- The novice-expert Web 2.0 divide can be even more difficult to close as novice users quickly get left behind.

c) Implications

(i) Implications for roles

If the opportunities that Web 2.0 technologies afford are to be capitalised on, then institutions need to recognise changing resource implications and plan a support infrastructure accordingly. This includes identification and resourcing of hybrid roles which help staff leverage technology appropriately, a move towards on-demand technical support for learning and teaching and encouragement of support communities where staff can develop Web 2.0 skills and experiment with incorporation into their working practices. Further, internally and externally focussed horizon scanning roles which (i) identify emerging technologies and trends of use, assess their applicability in different areas of academic and professional practice and (ii) help embed technology solutions in line with institutional strategies, policies and infrastructure will both aid institutions to become more effective and relieve pressure on staff in non-technology specific roles, enabling them to concentrate on their own areas of expertise. Such staff will need not only to be technological experts but also understand social interaction and how people work.

(ii) Staff development implications

Different levels of skills are apparent, with many staff still at the level of initial engagement while others have a much deeper understanding and applicable skill set. While the report on HE in a Web 2.0 World [34] recognises the processes of engaging with Web 2.0 technologies will develop a skill set that matches 21st century learning and employability skills – communication, collaboration, creativity, leadership and technology proficiency – unfortunately the time required to get up to speed with these technologies further amplifies the gap between novice and expert staff users. Thus, if large groups of staff are not to be left behind institutions will need to provide appropriate advice and development support for staff.

Given the need to instil a transformative change in approach and to understand social and group working skills, learning approaches focussing on these areas may provide a more effective way of tackling skills deficits than more traditional staff training. So for example, approaches which focus on transformation and threshold concepts [92] and social constructivism [93] should be considered. Action learning techniques in particular, which are beginning to be introduced into staff development methods within the sector [7], may prove particularly useful for supporting development of Web 2.0 related skills.

Finally, given the radical change that embracing Web 2.0 technologies requires of many staff, particular emphasis on the development of change agents – such as staff developers, change managers, project managers, horizon scanners, senior management and key staff in disciplinary or professional areas – to ensure that they are comfortable with Web 2.0 technologies and their capabilities is recommended. As Duke and Powell [15] argue and as the box below illustrates, without the buy-in of key staff, especially those with strategic influence, it will be difficult for institutions to capitalise on opportunities and embed changes.

“Middle level staff...Project managers, course team managers, programme managers, heads of learning and teaching and faculties are becoming very enthusiastic about Web 2.0. Senior staff are more nervous about the lack of control and the fact that the wikis etc. are sitting outwith the university infrastructure and IT Systems”.

Margo Blythman, University of the Arts

(iii) Institutional implications

While, to date, many institutions have allowed the use of Web 2.0 technologies to develop from the ground up increasing financial constraints and competition is likely to lead to a more top-down, strategic approach. Institutions will need to assess the real cost and benefits of Web 2.0 technology initiatives within their institution. This assessment will need to include the costs associated with duplication of systems and retraining of staff as well as the benefits to working practices and the student experience. JISC’s Benefits of ICT Investment Landscape Study’s (BILS) Evaluation Framework and Toolkit [94] and JISC infoNet’s Impact Calculator [95] may prove useful to institutions in this respect.

While activity review participants generally welcomed institutional support regarding Web 2.0, some concern was expressed that too many rules could stifle contributions and that striking a balance between staff freedom and institutional guidance or indeed regulation is imperative. For example, some institutions have witnessed a very strong adverse reaction to the introduction of Web 2.0 technologies and there have been cases of tools such as Facebook and Bebo being banned or restricted to a couple of hours use per day. Such strong reactions arise in the main from a lack of understanding of the benefits that these technologies bring to teaching and learning, research and knowledge exchange etc and need to be tackled through staff development – see subsection (ii) above. However, the openness of these forums does make the possibility for misuse of these technologies relatively high. Where they are advocated, institutions need to accept that they cannot police public forums, however equally institutions may have a duty of care “to make people aware about private and public profiles and how to protect yourself from the negative sides of these technologies e.g. cyber stalking”. [78]

A recent discussion on the WEBSITE-INFO-MGT JISC mail list regarding nuisance tweets on university Twitter sites illustrates some issues. For example, followers could add misleading or derogatory tweets on an institution’s external facing broadcast site such as research news and events, diminishing the values of the information.

**Nuisance tweets on university Twitter sites thread,
WEBSITE-INFO-MGT@JISCMail.AC.UK**

Finally, as Web 2.0 technologies and their applications continue to evolve, institutions will need to ensure that they continue to look to the future. A combination of top-down horizon scanning of drivers and technology capabilities, strategic leadership and funding combined with bottom-up experimentation is likely to work best. The key challenge for institutions is

how, within an increasingly resource constrained environment, to still encourage bottom-up experimentation and innovation which is compatible with institutional strategy and brings real cost-effective benefit to staff and students. Further, clear mechanisms for embedding successful Web 2.0 innovations across the institution will be required.

d) *Preparing for the future*

As discussed, the future of the Web and its impact on staff and institutions is inherently difficult to predict due to its emergent nature. The six big ideas behind Web 2.0 – individual production and user-generated content, harnessing the power of the crowd, data on an epic scale, architecture of participation, network effects and openness [9] – provide a good starting point for considering how the Web and its applications might develop. From consideration of these big ideas and experiences to date three broad areas of tension relating to Web 2.0, which are likely to affect staff and institutions within the sector, can be identified.

- Loci of control and responsibility – for staff and for institutions
- Increasing messiness versus emergence
- Exploration and innovation versus cost effective embedding

Loci of control and responsibility

Much has been discussed about Web 2.0 and changing loci of control. The openness, architecture of participation and the new business models which allow free use of social networking sites effectively moves the choice of technology environment from institution to individuals. Attempts by institutions to control where people meet virtually is unlikely to succeed because as discussed earlier, to collaborate and make effective use of the 'power of the crowd', staff need to go where their crowd – i.e. their area of specialism meets. Institutions do of course have economic, business and good governance constraints which may potentially be compromised by the ability of individuals to control their Web 2.0 adoption. While trying to control uptake is unlikely to produce effective use of Web 2.0 technologies, some constraints are likely to be necessary in order to ensure that institutions or individuals are not compromised. Indeed, getting the balance right will be key. However, the balance will come from experience and may evolve over time due political, economic, social, technological, legal or environmental changes.

Changing loci of control also affects the publishing and authority of information on the Web. For some academics, the egalitarianism of the Web challenges their role and quality assurance of the traditional academic peer review process. While openness with academic peers may be considered beneficial to collaboration, the rise of the amateur may challenge not only norms but core values. Transformational change may be necessary for some.

A change in loci of responsibility runs parallel to a change in loci of control. As discussed earlier, responsibility for actions and their consequences falls largely on the individual rather than the institution, although institutions have a duty of care to ensure staff and students are sufficiently aware of these responsibilities. Freedom and individual control does not come without responsibility.

Increasing 'messiness' versus emergence

The architecture of participation and inherent openness of Web 2.0 means that people are free to cross-link to a variety of differing information resources across a global network. There is no control or central structure; rather individuals add their own meaning through their cross-links and postings. This leads to an increasingly organic and 'messy' information network with no universal order or global meaning. Making sense of this information resource is increasingly difficult. However, the fact that data is on an epic scale and that individual's personal links are cross-linked with others means that collective patterns and characteristics emerge. These emergent features can help individuals make sense of the Web of information. For example, Folksonomies [96], which develop organically from personal free tagging of information and objects, can be used to help with interpretation and meaning. Similarly, observation of trending patterns on micro blogging sites such as Twitter can help indicate key events or ideas and importantly study of trends in social networking and collaboration should help improve understanding of how tools can be used. To use the Web effectively, consideration of the unstructured details and the emergent patterns need to be included.

Exploration and innovation versus cost effective embedding

The adoption of Web 2.0 has mainly grown from the ground up in individual institutions, supported by sector leadership from JISC and the funding councils. However, while institutions have not in general provided funding for these adoptions, they have provided the environment which encourages staff to explore new approaches. As discussed earlier, a more business and cost-benefit approach is likely to be adopted by institutions in the future. However, cost-effective embedding of institutionally supported Web 2.0 technologies and approaches needs to be balanced by ongoing exploration and innovation by both the institution and individual academic and professional practitioners.

Consideration of these three competing tensions together with the 'big ideas' behind the Web should provide institutions with a good starting point for effectively exploiting and embedding future Web technologies.

7 Conclusions, implications and recommendations

The Work-with-IT project has been successful in achieving its aims and objectives. As well as the primary deliverables – the consultative workshops, case studies and advice and guidance material, PESTLE analysis and Web 2.0 exploration – the Work-with-IT project has also produced the following outcomes:

- Stimulated debate on staff development with JISC and the project's network of stakeholders. This will in turn inform development of future stages of the programme. Since this project is about information gathering and production of advice and guidance, rather than a focussed dissemination, more focussed impact is difficult to assess;
- Enabled sharing of good and innovative practice related technology-enhanced working practices;
- Provided a sound evidence base for future planning by both JISC and institutions;
- Added to the knowledge of the emerging working practices, roles and competencies found within UK HE and FE;
- Raised awareness of the linkage between effective innovation, technology, and staff support and development.

The outputs and outcomes of the project are applicable across all types of HE and FE activity, be it teaching and learning, research, knowledge exchange or professional services. The information disseminated via the project website has been designed to be relevant to a range of practitioners, including those engaged in managing staff development, change and innovation through to individual members of staff interested in how to cope with evolving working practices.

Four potential limitations can be identified. Firstly, FE participation might have been greater. This was particularly an issue in the first workshop, although its effect was minimised by using the FE consultant's network of contacts to gather additional information. Secondly, there is no in depth case study which directly examines the impact of technology-enhanced working practices in libraries. As key exemplars of such changes were unable to meet the case study timescales, it was decided to ensure that librarian perspectives were included in the other case studies where relevant. Additionally, discussion with exemplars was also undertaken to ensure that these informed the findings of the project. The project website also contains a list of pointers to the exemplars. Further, the Web 2.0 reviews specifically addressed libraries in one of its four activity themes. Thirdly, the PESTLE analysis drew heavily on the original Work-with-IT case study institutions. While this provided significant in depth knowledge and expertise in technology-enhanced working with which to examine drivers and future scenarios, they were heavily informed by the individual participants' specific experiences - as with all such exercises. Finally, as the case studies and activity reviews each examine specific complex socio-technical contexts, care should be taken regarding extrapolation to the sector in general. In particular, the lessons learned are likely to be more transferable to wider contexts than specific bespoke technological solutions. So for example, bespoke research or staff development Web 2.0 tools may remain specific to certain groups or institutions.

The complex socio-technical systems-based methodology, on the whole, proved successful. In particular, the provision of a case study protocol which guided the institutional project teams was reported as being highly useful. As discussed above, the biggest potential limitation was difficulty in encouraging FE participation.

7.1 Conclusions

7.1.1 Current trends in technology-enhanced working

Technology-enhanced working is widespread and changes to technology and hence working practices is increasingly becoming the norm. Five major trends can be identified – Life without borders, the electronic office, Technology-enhanced delivery, Digital students and Changing loci of control and relationships. Particular implementations often include features from more than one trend. Overall technology-enhanced working practices are viewed positively, with a general feeling that technology is ‘enabling’, aiding institutions and staff alike to provide improved services and student experiences.

The changes to working practices are being driven both by institutional needs and individuals’ wish to adopt innovative practice. From an institutional perspective, in addition to improving effectiveness of business processes, satisfying regulatory requirements or maintaining competitive advantage etc., technology is often employed as a means of engendering cultural or institutional change. Innovations by individuals and the increasing use of Web 2.0 technologies means that institutions will need to adapt change management, support and staff development strategies.

7.1.2 Working in a Web 2.0 world

The six ‘big ideas’ associated with Web 2.0 – individual production and user-generated content, harnessing the power of the crowd, data on an epic scale, architecture of participation network effects and openness [9] – are already significantly impacting working practices, roles, responsibilities and relationships within HE and FE. While these ideas, in general, fit well with existing pedagogical and academic practice, the openness, architecture of participation and aggregation of results afforded by Web 2.0 presents both opportunities and challenges. Firstly, while it affords staff with more options to work innovatively with technology, this freedom is countered by the need to take more personal responsibility for the effects of their Web postings and interactions. Secondly, working with Web 2.0 technologies requires a cognitive shift, by both individual staff and institutional management, from previous data-led technological approaches to bottom-up approaches designed to leveraging emergence within the social Web. Thirdly, effective use of Web 2.0 means being part of a crowd. The use of particular Web 2.0 technologies will therefore be dictated by trends within specific projects, professional or disciplinary communities. Fourthly, Web 2.0 will further accentuate the blurring of boundaries between work and social identities. Staff may need support to find an appropriate “voice” within social and collaborative communities. Finally, inexperienced staff can quickly get left behind potentially creating a novice-expert Web 2.0 divide.

7.1.3 The future: drivers and institutional trends

A wide variety of factors are likely to affect the sector over the next five years. Economic factors are viewed as the most dominant overall with the current recession and resultant reduction in funding and increase in demand being the primary influences. From a political perspective, the potential change in government introduces a significant uncertainty as this may change government and funding council policies pertaining to funding, lifelong learning, research and knowledge exchange amongst others. Social factors, especially student and staff expectations and changing demographics, are also expected significantly to affect future HE and FE provision. From a technological perspective, new working practices will primarily be driven by the availability of technological solutions along with evolving Web 2.0 practices. Legal and regulatory compliance relating to copyright, IPR, data protection, health & safety discrimination and human rights will continue to impact working practices. Finally, availability and fitness of estate and the need to reduce carbon emissions are likely to be the most significant environmental factors over the next five years.

Over the next five years, these PESTLE factors are likely to lead to four general trends within the sector relating to institutional strategies and ethos– *lean thinking*, *flexible learning*, *risk management* and *collaboration & sharing*. Individual working practices will evolve depending on institutional strategies and ethos and the general working practices trends – life without borders, the electronic office, technology-enhanced delivery, digital students, and changing loci of control and relationships.

7.1.4 Evolution of staff roles and responsibilities

Staff roles are evolving as a result of technology-enhanced working practices. The emergence of hybrid roles which span traditional role boundaries is currently the most significant change. These roles will combine subject expertise with technology and/or social networking expertise. However, there is also an increase in specialised roles relating to technology. While in some cases these new roles are officially recognised in job descriptions, in many cases these new roles emerge informally through time.

The trend towards lean thinking and risk management focussed institutional strategies means that over the next five years staff roles are likely to become more well-defined, with an emphasis on key performance indicators, clearly identified responsibilities and alignment with institutional strategy. While some roles may become redundant new roles surrounding the co-ordination and negotiation of resources and quality/risk assessment and management may emerge. In particular, more business-focussed senior institutional roles and horizon scanning roles are likely to emerge. Further, the trend towards individual responsibility and accountability with regard to working practices will increase the tasks and responsibilities associated with roles at all levels.

The often organic evolution of roles makes staff and career development challenging. Staff development needs to take account of emerging demands and career development, especially for new hybrid roles, needs to be addressed.

7.1.5 Critical success factors

Effective (change) management is viewed as the critical factor for the successful implementation of new technology-enhanced working practices. Institutions require support and guidance on how to effectively manage the evolution of working practices. In particular, a holistic approach to change needs to be adopted with cross-area input to organisational strategy and policy development and where necessary structural changes.

Effective staff development is also identified as a key success factor. However, it is emphasised that the development needs are not solely related to IT and information skills; the development of skills relating to coping with change, social and relationship skills and learning skills are viewed as equally if not more important. 'Hard' skills training such as how to use a particular application are well provided for; however significant work requires to be undertaken to provide the softer skills which will enable staff to perform the new technology-enhanced working practices effectively.

Timely revision of human resources (HR) policies, procedures and practices are necessary if staff roles and responsibilities are to meet the needs of emerging working practices. Without this, institutions will be unable to effectively capitalise on the opportunities afforded by emerging technologies or be sufficiently agile to respond to changing PESTLE factors in a timely and effective manner.

Horizon scanning of internal and external drivers and developments also needs to be embedded in institutional processes and procedures if institutions are to be successful in the ever evolving environment.

Overall, the complexity of institutions and the number of external factors which influence change means that a holistic approach to managing the challenges of technological change needs to be adopted if institutions and staff are to successfully adopt technology-enhanced working practices is required. This requires examination of the potential effects and impacts through multiple perspectives from the outset.

Kay Moore, Manager of the Digital Fluency Case Study, Sheffield Hallam University

"I firmly believe that you can't change the technology without changing the systems, policies and processes that underpin this."

7.1.6 Key areas where change is required

Drawing on the key success factors identified and examination of current practice five key areas can be identified where change is required if institutions are to effectively embrace and embed technology-enhanced working practices.

Key areas for change

1. A more holistic approach needs to be adopted, where institutions ensure that organisational structures support timely revision and linkage to strategies, an understanding of the complexity of issues at the highest level and strategic leadership which empowers and encourages staff to evolve their working practices in line with strategy.
2. Human resources (HR) policies, procedures and practices need to be updated to effectively support and develop evolving staff roles. Without this, institutions will be unable to effectively capitalise on the opportunities afforded by emerging technologies or be sufficiently agile to respond to changing PESLE factors in a timely and effective manner.
3. While staff development is in general effective when it comes to 'hard' aspects such as how to use particular technologies, significant work is required to support development of 'soft' skills such as relationship management, boundary management, and understanding the potential and impact of technologies.
4. A more holistic approach to change management needs to be adopted which involves key institutional functions such as staff development, HR, IT services and change management from the outset of development projects.
5. Horizon scanning needs to be embedded in institutional processes and procedures if institutions are to be successful in the ever evolving environment.

7.1.7 Timeliness and relevance of the Work-with-IT study

The excellent levels of participation in the study and the interest generated in its outputs strongly illustrate the timeliness of this exploration of the impact of technology on working practices. The focus on staff as opposed to simply technology or business processes has been particularly welcomed by the community. Further, the fact that many of the issues identified are new illustrates the need for new and holistic approaches to staff and organisational development to be encouraged.

7.2 Summary of main implications of the evolution of working practices

7.2.1 For Staff

Changing working practices have the potential to have significant impact on staff. For example, staff may benefit from being able to work flexible hours and from flexible locations. However, this brings with it a significant blurring of boundaries between personal and work spaces. The increasing use of social networking tools further blurs boundaries between social and work identities. Staff will need to learn to manage a world where boundary blurring is increasingly the norm. Further, each member of staff will increasingly need to take individual responsibility and accountability with regard to their activities.

If staff are to work effectively and embrace new technology-enhanced working practices then they need to be flexible and willing to learn and adopt new skills and competencies. Many of

the required skills will match 21st century learning and employability skills – communication, collaboration, creativity, leadership and technology proficiency – which institutions are focussing on developing in their graduates. Keeping skills up to date will be most readily achieved if individual members of staff embrace lifelong learning and become reflective practitioners. This will enable staff to take an active role in identifying with their line manager their own skills needs and in the development of the appropriate skills.

Development of lifelong learning and reflection skills will also enable staff to develop mutual support networks with colleagues within and beyond their home institution.

7.2.2 For Institutions / Senior Management

a) *Furthering business objectives*

As the Work-with-IT case studies illustrate, the introduction of technology-enhanced working practices can be used to deliver innovative teaching and learning, research and knowledge exchange. When well-managed, such innovations can bring significant strategic benefit to institutions through attracting more students and through the quality of the student experience that they receive.

Similar impact can be achieved within research and knowledge exchange. For example, the Location Independent Working case study exemplifies how Coventry University used remote working to enable their commercial arm – Coventry University Enterprises Ltd – to grow their business beyond that which the physical campus capacity would allow. Where care is taken to ensure that the innovative working practices do not have a negative impact on staff a positive impact on staff retention and recruitment is to be expected.

Institutions may also use the introduction of technology-enhanced working practices to bring about more transformational change. The e-Mentor case study is a good example of this. At Oaklands College, the e-Mentor system is part of a wider change agenda designed to update staff skills and change culture to put the college at the forefront of eLearning and Technology. However, achievement of real technology-based transformational change requires a sound grasp of the business benefits of technology at a senior level within institutions

Technology-enhanced working also can be used to aid institutions in meeting statutory obligations and legal requirements. For example, technology can be used to ensure that required auditing information is captured in financial systems. Flexible working arrangements required by new Employment Law can also be facilitated through technology enhanced working. The Open University Part-time Working and Technology and the Location Independent Working case studies provide examples of how this can be achieved in different contexts.

Looking towards the near future, financial constraints, student trends and risk management are likely to dominate institutional thinking, necessitating top-down led changes to institutional focus and working practices. Increased regulation and managing the threat of litigation will have major implications for institutions. Compliance strategies and protocols will have to be developed in new areas such as Quality Assurance and Location Independent

Working. Flexible working and learning options will also impact upon institutions as they must provide the appropriate “duty of care” for staff and students alike. Institutions may therefore need to investment in staff development and infrastructure in order to deliver appropriate off-campus working environments.

b) Facilitating and resourcing change

If the opportunities that evolving technologies afford are to be capitalised upon, then institutions need to recognise changing resource implications and plan a support infrastructure accordingly. This includes identification and resourcing of hybrid roles which help staff leverage technology appropriately, a move towards on-demand technical support for learning and teaching and encouragement of support communities where staff can develop new skills and experiment how emerging technologies might best be incorporation into their working practices.

Additionally, institutions will need to support internally and externally focussed horizon scanning activities which (i) identify emerging technologies and trends of use, assess their applicability in different areas of academic and professional practice and (ii) help embed technology solutions in line with institutional strategies, policies and infrastructure will both aid institutions to become more effective and relieve pressure on staff in non-technology specific roles, enabling them to concentrate on their own areas of expertise. A combination of top-down horizon scanning, strategic leadership and funding combined with bottom-up experimentation is likely to be most effective. The key challenge for institutions is how, within an increasingly resource constrained environment, to still encourage bottom-up experimentation and innovation which is compatible with institutional strategy and brings real cost-effective benefit to staff and students.

Reviewing and refining institutional policy in a timely manner will also be important. Over regulation of activities may curb innovation and so striking an effective balance between staff freedom and institutional guidance or indeed regulation is imperative. However, policies will be required to facilitate effective practice and to ensure that institutions provide their staff with sufficient guidance to mitigate against the negative sides of some social technologies.

Finally, given increasing financial constraints and competition combined with the changing loci of control associated with Web 2.0 technologies, institutions will need to develop processes for assessing the effectiveness of bottom-up technological-enhanced change. This assessment will need to include the costs associated with duplication of systems and retraining of staff as well as the benefits to working practices and the student experience. JISC’s Benefits of ICT Investment Landscape Study’s (BIILS) Evaluation Framework and Toolkit [94] and JISC infoNet’s Impact Calculator [95] may prove useful to institutions in this respect.

7.2.3 For change managers

As the change environment is highly complex in nature, with many additional non-technology influencing factors, change managers need to be open to the complexity and work with managers from a range of different areas. For example, staff development managers, line managers, staff representatives, technology support services and business process experts

and potentially end customers all need to be involved in developing the change strategy, new policy development, implementing the communication strategy etc.

The changes to working practices engendered by technology may be top-down, resulting from strategic institutional directives or bottom-up as individual members of staff adopt emerging technologies to improve their teaching and learning, research or knowledge exchange activities. Change managers therefore need to recognise that change may be bi-directional and thus as well as implementing well-planned change management strategies, they may also need to react to emerging changes.

If the changes in practice are to be effective, clear strategic direction, strong institutional leadership and well communicated rationales for change will be required. Further, as Duke and Powell [15] argue without the buy-in of key staff, especially those with strategic influence, it will be difficult for institutions to capitalise on opportunities and embed changes. Change managers will therefore need to identify and work with champions and key staff to ensure strong leadership. In particular, line managers must be brought on board to be key advocates of change.

See the JISC infoNet InfoKit on Change Management [10] for general change management advice and guidance.

7.2.4 For staff developers and HR managers

In addition to working with a wider change management team, the following implications for staff developers can be identified.

Identifying training needs can be challenging. Better tools for base-lining the existing skills of staff and identifying the new skills set required to effectively use the new technology-enhanced working practice are required. Training provision also needs to be updated to include the softer skills identified in Section 2.3 and 6.3 as vital to effectively working with new technology.

Finding an effective way of developing such soft skills is not easy. One promising method is to move from traditional short training sessions to provision of a learning scaffolding approach where soft skills are developed gradually over time in a more holistic way. Given the need to instil a transformative change in approach and to understand social and group working skills, scaffolded learning approaches focussing on these areas may provide a more effective way of tackling skills deficits than more traditional staff training. For example, approaches which focus on transformation and threshold concepts [92], social constructivism [93] and action learning techniques [7] should be considered. Further, given the increasing move towards collaborative working and the need to align practices with strategic direction and quality and risk management procedures staff development activities that facilitate team development planning and development of reflective and strategically aware practitioners across all categories of staff will become increasingly important.

Evolving roles and skills requirements also has implications for HR managers. For example, the new skills and competencies required mean that job descriptions are likely to require revision. It is important that such job reviews are timely and criteria for performance

assessment are appropriately aligned. HR managers will also need to support line managers in identifying the need for new roles and developing appropriate job specifications. Further, for emerging hybrid roles such as eResearchers, eEditors, Learning Technologists, social network facilitators or Repository Managers, staff developers need to work with line managers and the staff involved to explore potential career paths. This is particularly problematic where success is generally dependent on external disciplinary peer acceptance as in the case of researchers or where individuals work across institutional boundaries. This is, therefore, an area where further significant research and development is required. Additionally, the predicted trends in lean thinking and risk management may lead to more 'business' focussed roles such as Pro-Vice Chancellor for Enterprise, Chief Operating Officer and Chief Financial Officer. Finally, the implication of evolving roles and skills requirements for national job families and evaluation methodologies used within the sector such as HERA [97] and Hay [98] may need to be examined.

Finally, some of the challenges for staff with regard to skills and relationships are still unknown and lack of horizon scanning and strategic planning around these issues could have serious implications for effective staff development and HR management. Inclusion of staff developers in the full technological development and change management processes is also changing their role in some instances. For example, staff developers reported being used as tools for change and providing business process advice.

7.3 Recommendations

7.3.1 Key areas where change is required

Work-with-IT project has identified five key areas where change is required if institutions are to effectively embrace and embed technology-enhanced working practices.

1. A more holistic approach needs to be adopted, where institutions ensure that organisational structures support timely revision and linkage to strategies, an understanding of the complexity of issues at the highest level and strategic leadership which empowers and encourages staff to evolve their working practices in line with strategy.
2. Human resources (HR) policies, procedures and practices need to be updated to effectively support and develop evolving staff roles. Without this, institutions will be unable to effectively capitalise on the opportunities afforded by emerging technologies or be sufficiently agile to respond to changing PES(T)LE factors in a timely and effective manner.
3. While staff development is in general effective when it comes to 'hard' aspects such as how to use particular technologies, significant work is required to support development of 'soft' skills such as relationship management, boundary management, and understanding the potential and impact of technologies.
4. A more holistic approach to change management needs to be adopted which involves key institutional functions such as staff development, HR, IT services and change management from the outset of development projects.
5. Horizon scanning needs to be embedded in institutional processes and procedures if institutions are to be successful in the ever evolving environment.

The project therefore recommends that JISC considers how these key areas of changes could be affected and improve practice piloted and embedded throughout the sector.

As a result of such future work, the following outcomes should be expected:

- Embedding of good and innovative practice with respect to technology-enhanced working practices;
- Stimulation of innovative working practices which effectively used technology to meet institutional objectives;
- Sharing of effective practice with respect to developing staff development in support of a rapidly changing, technology-enhanced working environment;
- Further extension of awareness of the linkage between effective innovation, technology, and staff support and development;
- Extension of a sound evidence base for future planning by both JISC and institutions;
- Further enhancement the information and support delivered through the JISC advisory services.

7.3.2 Areas of additional work

a) Effective practice in horizon scanning and planning

The Work-with-IT study suggests that a number of ad hoc methods are used by institutions to scan the horizon and identify potential consequences. Current methods in use are of varying effectiveness. Three reasons can be identified: (i) there is often a discontinuity and lag between what people are doing on the ground and institutional awareness; (ii) people on the ground do not have a adequate grasp of the wider socio-environmental context;(iii) senior management does not have sufficient understanding of the capabilities of technology nor the implications of technology enhanced working practices. Two current trends are likely to exacerbate this. Firstly, the increasing adoption of Web 2.0 technologies by individuals which directly by-pass existing IT provision management and planning activities. Secondly, the move towards inter-institution collaborative working is bringing unexpected service demands, incompatibilities between different institutional policies and working practices.

It is therefore suggested that JISC considers the need for a study into effective practice in horizon scanning and planning activities for a collaborative/Web 2.0 world.

b) Change management

It is recommended that the current JISC infoNet on change management be updated to deal with institutional management of ground-up change.

c) *Developing business cases*

Advice and guidance on assessing the business case which includes non-tangible benefits and staff related costs as well as IT infrastructure and support costs will be required. JISC has in the past commissioned several pieces of work relating to cost benefits analysis of IT and e-Learning etc. It is therefore suggested that JISC considers whether existing costs benefit work covers this need or whether further work should be commissioned.

d) *Innovative practice lifecycle management*

As discussed in sections 5 and 6 innovative practice evolves due to a number of different, often interrelated external PESTLE factors and internal institutional environment. Further the changes can be formal or informal with top-down or bottom-up influences. Business needs or potentials need to be identified, work practices evolved or planned, staff developed, support infrastructure put in place, benefits and costs assessed before institutional embedding, roles refined or new roles recruited, the change managed etc.

An innovation/innovative practice lifecycle approach – which offers a structural framework that includes components such as: horizon scanning, planning and change management, innovation evaluation, transfer to ‘service’, staff development – may help institutions to manage the evolution of working practices more effectively. The objective of the framework would be to illustrate the complexity of factors that affect the changing working practices and the activities that an institution needs to consider in order to support and manage this evolution effectively.

JISC might therefore wish to consider development of an innovative practice lifecycle toolkit. However, we would suggest that some initial assessment of the usefulness of this view be undertaken first.

e) *Scenarios and scenario planning*

There have now been a number of JISC projects which have engaged in some form of Scenario Planning, producing a range of HE and FE related scenarios and other outputs. We would therefore suggest that JISC explores whether it would be useful to develop a repository of scenarios to complement the existing JISC infoNet toolkit on Scenario Planning. Further, it may be appropriate to update this toolkit in light of evolving experience within the sector.

f) *Skills and competencies toolkit and staff development materials*

It is recommended that JISC considers the development of a toolkit which allows institutions and individuals to assess their readiness, skills and competencies relating to effective technology-enhanced working.

Given the fact that many skills related issues have been known for some time, innovative staff development materials for developing soft skills and competencies and for implementing technology-enhanced working are also required.

g) Roles and responsibilities

The Work-with-IT project has highlighted a number of trends in roles - hybrid roles, facilitation roles, strategic roles and potentially quantity surveyor type roles amongst others. The most significant issues with these changing roles are lack of career development paths and lack of formal recognition within job specifications of role evolution.

It is suggested that JISC considers undertaking work in conjunction with institutions and the relevant professional bodies to look at innovative career development paths for these emerging roles. The issue relating to formalising roles and responsibilities can be dealt with by well-targeted advice to HR and line managers, perhaps as part of innovative practice lifecycle management.

7.3.3 Embedding, support and dissemination

It is recommended that JISC engages key professional organisations as well as JISC Comms and relevant JISC Services to ensure that the outputs of this work are well-targeted. In particular, it is recommended that JISC work with the relevant sector professional bodies and associations to develop appropriate advice and guidance materials in order to improve embedding of effective practice within the UK HE and FE sector. Further, appropriate mechanisms need to be developed to ensure that the professional bodies and JISC infoNet and JISC Netskills can continue to support the sector in developing and embedding effective working practices and the evolution of staff roles and responsibilities.

8 Appendix A



Case Study Protocol

a) Overview

The general aim of the case study is to demonstrate how technological changes have necessitated changes to working practices, the impact and effect of those changes on staff, students and the institution involved. The specific area which this case study will explore is summarised in the corresponding Case Study Participation Agreement.

This case study protocol details the framework for the case study, providing a guide to aid the institutional case study manager to deliver a structured investigation of the changes and impact. It is important that the protocol is followed to ensure consistency across case studies and to allow cross case study analysis of the changes to working practices and their impact.

In some cases it may be appropriate to adapt the specified framework to capture an important issue that arises from the questioning and reflective discussions. Any adaption must be agreed in advance with the Work-with-IT project manager.

The protocol is split into five stages: First, in section b), participant engagement is addressed. Next, in sections c)-h), the main information gathering exercises are described: capturing the context, developing the personal vignettes and impact analysis. The outputs of these provide the majority of the information required in the case study report the requirements for which are outlines in section i). The case study protocol finishes in section j) with a summary of requirements, deadlines and contact details for further advice.

b) Participant Engagement

The types and exact number of participants in the case study will be discussed and agreed during the start-up case study visit by the Work-with-IT project team.

The case study will be undertaken by informed consent. All participants in the case study must read and sign the Case Study Participation Agreement for Individuals which accompanies this Case Study Protocol.

c) Capturing the Context

The first stage of the case study is initial capture of the context of the case study – the technology, processes, business drivers and stakeholders and relationships. As Figure 2 above illustrates, there are in effect two processes – the actual new technology-enhanced

working practice and the change process – which are being investigated. Both of these interrelated processes are set within wider institutional and external environments.

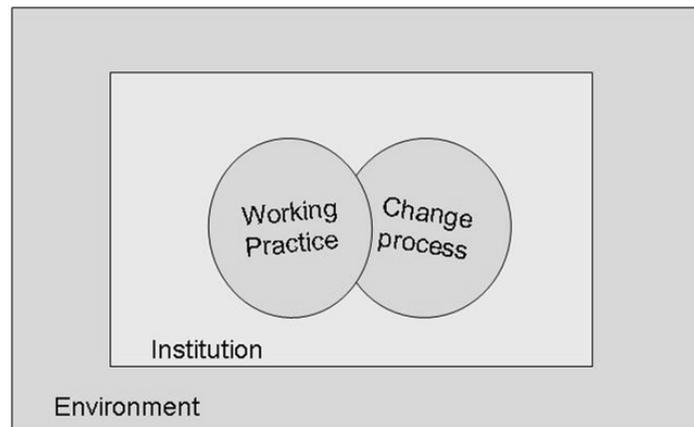


Figure 4: The processes being investigated

The Soft Systems Methodology (SSM) based approach being used suggests three strands of interrelated analysis of the systems under investigation – technology change¹¹, social and political.

The following questions are used to build a rich picture and accompanying narrative of the case study context. In the first instance the Work-with-IT project team will help the institutional case study manager develop this during the site visit. These questions should then be used at the start of each interview to capture individual practitioners' perspectives. The rich picture will therefore evolve as the case study proceeds.

- What is the purpose of the 'working practice'?
- Who are its 'customers'?
- What different roles participate in the working practice?
- Who or what is affected by the working practice?
- What different roles participated in the change?
- What was the purpose of the change?
- What were the drivers for change?
- Who had ownership of the driver? The change?
- Who could stop the new working practice? The change?

It may be helpful to show the developing rich picture to the practitioners for comment.

¹¹ Known as the purposeful system in SSM

d) *Developing the Personal Vignettes*

The objective of this phase of the case study is to develop a series of personal vignettes (4-6) of 500-1000 words which capture from an individual's perspective how technology change has impacted the working practice under investigation, their attitude to the change and issues which have arisen, how in their opinion it has indirectly affected either the student experience or other staff/services and how they expect their role to change in future.

By choosing a practitioner accounts approach, this allows both the power of the narrative to be exploited when conveying findings to peer groups and other stakeholders, while also providing a range of scenarios which can be used as a basis for future exploration and identification of advice and guidance requirements.

A student-focussed narrative may also be developed depending on the particular context.

e) *Semi-Structured Questioning Technique*

A semi-structured questions framework is provided to aid development of the personal vignettes. This consists of a series of open-ended questions designed to probe the changes in working practices and their impact at a personal level. The use of open-ended questions facilitates consistency across individual cases while giving the practitioners the opportunity to bring to bear their own conceptualisations of the working practice and changes. This enables open-ended exploration of the topic, capturing individual perspectives while providing a framework for analysis across multiple interviews.

While there may be a temptation to simply hand over the questions to the practitioner (interviewee) to develop their personal vignette, it is strongly recommended that the institutional case study manager or designated researcher is actively involved in the questioning process as the interactive process of reflection brings much benefit, especially in development new insights.

When posing the questions it is important for the questioner to remain as neutral as possible, open to the practitioner's interpretation of context and events. The prompt questions should be followed up where appropriate to tease out interesting or unexpected comments. Care should be taken not to interrupt the practitioner. However, on occasion it may be necessary to intercede in order to keep focussed on the task objectives.

After the interviews follow-ups may be necessary to clarify practitioners' comments or pursue an additional line of questioning that had arisen from other conversations.

f) *The Questions*

(i) *Changes to Working Practice*

How has the new working practice changed your working?

What new working relationships developed? Were they anticipated?

What impact has the change had on:

- Where you work?

- How you manage your time?
- Who you work with?
- Pressures of you job?
- How you view your job? Your career?

(ii)Role

How has your role evolved due to technology:

- Officially? (i.e. your job description)
- Unofficially? (i.e. tacit expectations)

What tensions are there between:

- Your evolved role and traditional roles? For example has role slippage occurred where you have taken on /lost aspects of your role?
- Official and unofficial?

(iii) Attitudes

How do you feel about:

- The changes in working practice?
- The changes to your role?
- How the change has been managed?

Prompts: positive and negative, winner or loser, coerced or empowered, worries, expectations, trust

(iv) Norms and Values

How have the expectations of your role changed? These expectations may be formal or tacit and may arise from peers, students, management or others.

How is performance relating to the changed working practice measured:

- By you?
- Your line manager?
- Your peers?

(v)Skills

How have the skills required of you changed? Please give examples.

Prompts:

- coping with change
- Social and relational
- Learning skills

- Technology related skills
- Other?

Do you view this as up-skilling, down-skilling or simply re-skilling? Please explain why

How have the changes in requirements been:

- Recognised by management?
- Met?
- Valued?

(vi) Student Experience

How has the new working practice changed the student experience? Please provide concrete examples.

Has this been a positive change for students?

g) Writing the Vignette

Having carried out the questioning process there will be a rich pool of information from which personal vignettes may be constructed. Individual vignettes should consist of personal, structured reflections on the change to working practice at the centre of the case study. Summarising this information into a coherent and informative vignette will require considered reflection.

The semi-structure questions provide good guidance as to the content of the vignette. It may help to also consider the following questions:

1. What are the key points that the individual practitioner's reflection will highlight?
2. Have the following been covered in individual vignettes:
 - a. Role?
 - b. Personal impact of the change?
 - c. Skill changes?
3. Have the following key points been covered when the series of vignettes is examined as a whole:
 - a. Different perspectives arising from differing roles?
 - b. Where appropriate, the impact on the student experience?

The vignette may be written by the practitioner or by the institutional case study manager in collaboration with the practitioner.

The Work-with-IT project team will offer support and advice on the development of the vignettes. To aid this, at least one first draft of a vignette should be provided to the project team in August. The team will then provide feedback – written or by phone – as appropriate.

h) Impact Analysis

The objective of the impact analysis is to:

- (i) evaluate the overall effect on the workforce of new technology environments
- (ii) provide an overview of its staff development policy and roles
- (iii) evaluate the effectiveness of this policy in addressing the issues arising from technology-driven changes in working practices, identifying where gaps need to be addressed.

To achieve this, institutions are asked to consider the series of probing questions designed to tease out indicators of effectiveness for comparison against the institution's own aspirations within the context of Scott-Morton's [22] MIT90s Framework illustrated in Figure 3 above. The MIT90s model provides a useful framework for discussing the factors that influence change in organisations. No specific direction of change is assumed but the model suggests that strategic and technological drivers for change are mediated by the institutional culture i.e. organisational structures, management processes and development of individuals and their roles.

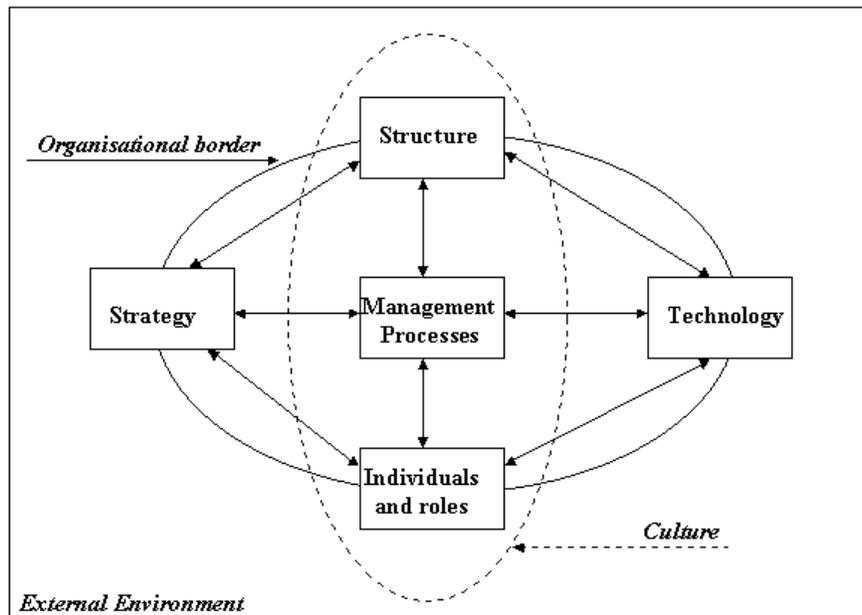


Figure 5: Overview of MIT90s Framework

The following questions should be considered within the case study context illustrated in Figure 2 and the Rich Picture developed as part of 'Capturing the Context'. It is strongly recommended that this is carried out through a 'brain storming' approach which includes a spectrum of key stakeholders and is informed by the personal vignettes.

Effect on Workforce

1. What factors might affect the workforce within the case study context?

Figure 3 above provides a starting point for identifying the types of factors.

2. How might the impact of these factors be assessed either qualitatively or quantitatively?

Attention should be paid here to the differing perspectives and power dynamics.

3. In order to be meaningful to the full range of stakeholders, who should be involved in the assessment?

Skills development policy

4. How and by whom are skills gaps identified?
5. What, if any, are the tensions between skills gaps and filling the gaps?
6. Who could resolve these tensions?
7. How is the effectiveness of staff development policy currently assessed?
8. What success criteria would the different stakeholder groups set?

i) Developing the Report

The case study activities have been designed to gather much of the details required for the report.

(i) Overview (500-1000 words)

The overview should provide a summary of the case study context and will be based on a synthesis of the information captured in the 'capturing the context' process detailed in section c) above.

(ii) Personal Vignettes

This section of the report presents the personal practitioner vignettes. It should begin with a short introductory paragraph explaining why the particular practitioner perspectives were selected, followed by the individual vignettes.

(iii) Impact Analysis (400-800 words)

The impact analysis consists of three sections.

Firstly, using the factors and criteria from the brain storming session an evidence-based reflective analysis of the overall effect on the workforce of new technology environments should be presented.

Secondly a brief overview of the institution's staff development policy and roles should be provided.

Finally, using the brain storming material, an evidence-based assessment of the effectiveness of this policy in addressing the issues arising from technology-driven changes in working practices should be provided. This should include identification of gaps that need to be addressed and how institutions could be supported in closing the gaps. This will inform the next phase of the Work-with-IT project which will produce advice and guidance material.

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(iv) Reflective Analysis of the Case Study

The report should conclude with a short reflective analysis of the case study. Questions which may help inform this reflection include:

1. What did you learn from participating in the case study?
2. What did your institution gain from participating in the study?
3. What are the important issues that you would recommend that JISC research in more detail on behalf of the community?
4. What support and advice could be provided for the community? Please prioritise.
5. Was the case study protocol helpful? How could it be improved?
6. Was the level of support provided compatible with the task and the financial resources?

j) And finally

(i) Deadlines

First draft of report – 11th September

Final version of report – 17th October

(ii) Contact Details

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9 References

1. Microsoft. *Microsoft Sharepoint Server - Connecting People, Processes and Information*. [Last Accessed 07/01/10]; Available from: <http://sharepoint.microsoft.com/Pages/Default.aspx>.
2. Learning Objects. *Learning Objects Inc: Campus Pack*. 2009 [Last Accessed 31/01/10]; Available from: <http://www.learningobjects.com/campuspackfusion.jsp>.
3. Open University. *Cloudworks: Sharing ideas and experience for teaching and learning*. 2008 [Last Accessed 22/12/09]; Available from: <http://ouldi.open.ac.uk/cloudworks.html>.
4. Open University. *Cloudworks*. 2008 [Last Accessed 01/12/09]; Available from: cloudworks.ac.uk.
5. Day, L., *The new generation of activists or just apathetic?*, in *Epigramonline: Bristol University's independent student newspaper*. 2009.
6. Conole, G., *Activity Review Interview with Grainne Conole*, Open University, D. Cullen, Editor. 2009.
7. Wilson, A., *Activity Review Interview with Andy Wilson*, Loughborough University, D. Cullen, Editor. 2009.
8. University of Strathclyde. *PiP: Principles in Patterns*. 2008 [Last Accessed 07/01/10]; Available from: <http://www.principlesinpatterns.ac.uk>.
9. Anderson, P., *What is Web 2.0: ideas, technologies and implications for education*. 2007, JISC Technology & Standards Watch. p. 1-64.
10. JISC InfoNet. *JISC infoNet - Change Management infoKit - Overview and Introduction*. 2007 [Last Accessed 07/01/10]; Available from: www.jiscinfonet.ac.uk/infokits/change-management.
11. Scott, J. *Flexible Employment Options*. 2008 [Last Accessed 07/01/10]; Available from: <http://www.staffs.ac.uk/feo/>.
12. McDonald, D., D. Cullen, and A. Comrie, *Work-with-IT Workshops report*. 2008, University of Strathclyde/JISC.
13. JISC. *FE & HE roles, competencies & relationships in support of a high-level domain architecture map*. 2009 [Last Accessed 31/01/10]; Available from: <http://www.jisc.ac.uk/whatwedo/programmes/staffroles/rolesresponsibilities.aspx>.
14. JISC. *Scenario Planning*. 2008 [Last Accessed 31/01/10]; Available from: <http://www.jisc.ac.uk/whatwedo/programmes/staffroles/scenarioplanning.aspx>.
15. Duke, J., A. Jordan, and B. Powell, *A study for the JISC into the integration of technology into institutional strategies*. 2009, JISC.
16. Baxter, J., *A Case Study of Online Collaborative Work in a Large First Year Psychology Class*, in *REAP International Online Conference on Assessment Design for Learner Responsibility*. 2007.

17. University of Strathclyde and DEGW. *Explore It: Effective Spaces for Working in Higher and Further Education*. 2008 [Last Accessed 31/01/10]; Available from: <http://www.exploreacademicworkplace.com>.
18. Franklin, T. and M. van Harmelen, *Web 2.0 for Content for Learning and Teaching in Higher Education*. 2007, Franklin Consulting, University of Manchester. p. 1-29.
19. McDonald, D., D. Cullen, and A. Comrie, *Technology-enhanced working: Advice and Guidance for Staff Development and Change Managers*. 2008, University of Strathclyde/JISC.
20. Yin, R.K., *Case Study Research: Design and Methods*. 2003, California: Sage Publications.
21. Checkland, P., *Soft Systems Methodology: a 30-year retrospective*. 1999: John Wiley & Sons Ltd.
22. Scott Morton, M.S., *The Corporation of the 1990s: Information Technology and Organisational Transformation*. 1991, New York: Oxford University Press.
23. Martin, A., *DigEuLit – a European Framework for Digital Literacy: a Progress Report*. 2005, University of Glasgow.
24. Katz, R., *The ECAR study of undergraduate students and information technology*. 2006, Educuse.
25. Sherpa RoMEO. *SHERPA RoMEO: Publisher copyright policies & self-archiving*. 2006-2008 [Last Accessed 31/01/10].
26. JISC infoNet. *PESTLE and SWOT Analyses. Tools & Techniques* 2009 [Last Accessed 07/01/10]; Available from: <http://www.jiscinfonet.ac.uk/tools/pestle-swot>.
27. SFC. *Research Pools*. 2009 [Last Accessed 18/01/10]; Available from: <http://www.sfc.ac.uk/research/researchpools/researchpools.aspx>.
28. HEFCE. *Centres for Knowledge Exchange*. 2009 [Last Accessed 18/01/10]; Available from: <http://www.hefce.ac.uk/econsoc/buscom/heif/centres/>.
29. North West Regional College. *Regional Management Information Systems. Work-with-IT: JISC Study into the Evolution of Working Practices* 2008-2009 [Last Accessed 07/01/10]; Available from: <http://www.work-with-it.org.uk/CaseStudies/RegionalManagementInformationSystems.aspx>.
30. European Commission. *The Bologna Process - Towards the European Higher Education Area*. 2009 [Last Accessed 18/01/10]; Available from: http://ec.europa.eu/education/higher-education/doc1290_en.htm.
31. Hazelkorn, E., *The Impact of League Tables and Ranking Systems on Higher Education Decision Making*. Higher Education Management and Policy, 2007. **19**(2).
32. West Lothian College. *Enhanced Vocational Training at Work. Work-with-IT: JISC Study into the Evolution of Working Practices* 2008-9 [Last Accessed 07/01/10]; Available from: <http://www.work-with-it.org.uk/CaseStudies/EnhancingVocationalTrainingatWork.aspx>.
33. HEFCE. *The National Student Survey*. 2010 [Last Accessed 18/01/10]; Available from: <http://www.thestudentsurvey.com/>.

34. Hughes, A., *Higher Education in a Web 2.0 World: Report of an independent Committee of Inquiry into the impact on higher education of students' widespread use of Web 2.0 technologies*. 2009, JISC.
35. Coventry University. *Paperless Admissions*. Work-with-IT: JISC Study into the Evolution of Working Practices 2008 [Last Accessed 07/01/10]; Available from: <http://www.work-with-it.org.uk/CaseStudies/PaperlessAdmissions.aspx>.
36. Coventry University. *Location Independent Working*. Work-with-IT: JISC Study into the Evolution of Working Practices 2008 [Last Accessed 07/01/10]; Available from: <http://www.work-with-it.org.uk/CaseStudies/LocationIndependentWorking.aspx>.
37. Open University. *Part-time Working and Technology*. Work-with-IT: JISC Study into the Evolution of Working Practices 2008-2009 [Last Accessed 07/01/10]; Available from: <http://www.work-with-it.org.uk/CaseStudies/PartTimeWorkingTechnology.aspx>.
38. Whittemore, S. and C. Dunn, *JISC BCE Consultation Workshop Series 2008/2009 Report*. 2009, JISC.
39. JISC. *Business & Community Engagement Programme*. 2009 [Last Accessed 12/12/09]; Available from: <http://www.jisc.ac.uk/whatwedo/programmes/bce.aspx>.
40. JISC Legal. *JISC Legal: Legal Guidance for ICT Use in Education and Research*. 2009 [Last Accessed 18/01/10]; Available from: <http://www.jisclegal.ac.uk>.
41. SMG. *SMG: Space Management Group*. [Last Accessed 07/01/10]; Available from: <http://www.smg.ac.uk/index.html>.
42. Oakland College. *e-Mentors: Digital Native Students*. Work-with-IT: JISC Study into the Evolution of Working Practices 2008-9 [Last Accessed 07/01/10]; Available from: <http://www.work-with-it.org.uk/CaseStudies/EMentorsDigitalNativeStudents.aspx>.
43. James, P. and L. Hopkinson, *Sustainable ICT in Further and Higher Education*. 2009.
44. HEEPI. *HEEPI: Higher Education - Environmental Performance Improvement*. [Last Accessed 07/01/10]; Available from: <http://www.heepi.org.uk/>.
45. SustelT. *Sustainable ICT in Further and Higher Education Case Studies*. [A report for the Joint Information Systems Committee (JISC)] 2009 January 2009 [Last Accessed 07/01/10]; Available from: <http://www.susteit.org.uk/cases/index.php>.
46. HEFCE, *Carbon reduction target and strategy for higher education in England*. 2010.
47. Womack, J.P. and D.T. Jones, *Lean thinking: banish waste and create wealth in your corporation*. 2003, London: Simon & Schuster UK Ltd.
48. Julien, D.M. and B. Tjahjono, *Lean thinking implementation at a safari park*. Business Process Management Journal, 2009. **15**(3): p. 321-335.
49. Bicheno, J., *The New Lean Toolbox: Towards Fast, Flexible Flow*. 2004, Buckingham: PICSIE Books.
50. DES, *The future of higher education*, Department for Education and Skills, Editor. 2003.
51. Casey, J. and P. Wilson, *A practical guide to providing flexible learning in further and higher education*. 2006, QAA: Gloucester.

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Version:2.0

Contact: Diane.McDonald@strath.ac.uk

Date: 13/03/09

52. HEFCE. *Flexible learning pathfinders*. 2010 [Last Accessed 18/01/10]; Available from: <http://www.hefce.ac.uk/learning/flexible/>.
53. JISC infoNet. *Risk Management infoKit - Overview and Introduction*. 2007 [Last Accessed 07/01/10]; Available from: <http://www.jiscinfonet.ac.uk/InfoKits/risk-management>.
54. QAA. *Enhancement-led institutional review:Scotland*. [Last Accessed 18/01/10]; Available from: <http://www.qaa.ac.uk/reviews/ELIR/default.asp>.
55. HESA. *Publications and products*. [Last Accessed 31/01/10]; Available from: http://www.hesa.ac.uk/index.php/component/option.com_pubs/Itemid,122/.
56. Kings College London. *E-Research. Work-with-IT: JISC Study into the Evolution of Working Practices 2008-9* [Last Accessed 07/01/10]; Available from: <http://www.work-with-it.org.uk/CaseStudies/EResearch.aspx>.
57. O'Reilly, T. (2005) *What Is Web 2.0: Design Patterns and Business Models for the Next Generation of Software*. [Last Accessed 17/11/2009]; Available from: <http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html>.
58. JISC, *What is Web 2.0? Ideas, technologies and implications for education* in *Briefing Paper*. 2007, JISC.
59. Berners-Lee, T., *developerWorks Interviews, 22nd August, 2006*, Laningham, Editor. 2006.
60. Bennet, L., *Activity Review Interview with Liz Bennet, University of Huddersfield*, D. Cullen, Editor. 2009.
61. Stewart, J., *Which Scholars use Web 2.0 and how? Conceptualising Web 2.0 Innovation in Academia as a Researchable Concept*, in *The Influence and Impact of Web 2.0 on e-Research Infrastructure, Applications and Users*, Edinburgh, Editor. 2009.
62. Read, A., *Activity Review Interview with Adam Read, University College Plymouth*, D. Cullen, Editor. 2009.
63. Twitter. *Twitter*. 2009 [Last Accessed; Available from: <http://twitter.com/>].
64. Park, K., *Activity Review Interview with Kenneth Park, cardonald College*, D. Cullen, Editor. 2009.
65. myExperiment. *myExperiment*. [Last Accessed 07/01/10]; Available from: www.myexperiment.org.
66. Neylon, C., *Success Stories: Walking the Walk: The Experience of Using Web2 Tools in Active Experimental Research Projects*, in *The Influence and Impact of Web 2.0 on e-Research Infrastructure, Applications and Users*, Edinburgh, Editor. 2009.
67. Galley, R., *Activity Review Interview with Rebecca Galley, Open University*, D. Cullen, Editor. 2009.
68. Warburton, S., *Activity review interview, Steven Warburton, Kings College London*, D. McDonald, Editor. 2009.
69. Skype Limited. *Skype - Make free calls and great value calls on the internet*. 2009 [Last Accessed; Available from: <http://www.skype.com/intl/en-gb/>].

70. Facebook. *Welcome to Facebook*. 2009 [Last Accessed 07/01/10]; Available from: <http://www.facebook.com/>.
71. LinkedIn. *Relationships Matter - LinkedIn*. 2009 [Last Accessed 07/01/10]; Available from: <http://www.linkedin.com/>.
72. Lavrusik, V. (2009) *The 10 Ways Universities Can Use Social Media*. Mashable.com, [Last Accessed 17/11/2009]; Available from: <http://mashable.com/2009/07/23/alumni-social-media/>.
73. Alder, L., *Activity review interview, Lucy Alder, Alumni Officer, University of Strathclyde*, D. Cullen, Editor. 2009.
74. Greenhow, C., *Social Scholarship: Applying Social Networking Technologies to Research Practices*. Knowledge Quest, 2009. **37**(4): p. 42-47.
75. JISC. *The Web2rights project*. 2009 [Last Accessed 07/01/10]; Available from: <http://www.web2rights.org.uk/index.html>.
76. FriendFeed. *FriendFeed*. [Last Accessed 07/01/10]; Available from: <http://friendfeed.com/>.
77. Lipka, S., *Colleges "Don't Own the Conversation Anymore"*. Chronicle of Higher Education, 2009. **55**(35).
78. Blythman, M., *Activity Review Interview with Margo Blythman, University of the Arts*, D. Cullen, Editor. 2009.
79. Rogers, A., *Get Wiki with it*, in *Wired*. 2006. p. 30-32.
80. Smith, D.M., *Key Issues for Web 2.0 and Beyond*. 2009, Gartner.
81. Hall, W., D. De Roure, and N. Shadbolt, *The evolution of the Web and implications for eResearch*. Philosophical transactions: Series A, Mathematical, physical, and engineering sciences, 2009. **367**(1890): p. 991-1001.
82. McCool, R., *Rethinking the Semantic Web, Part 1*. IEEE Internet Computing, 2005. **9**(6): p. 88,86-88.
83. JISC. *Mobile Learning*. 2009 [Last Accessed 07/01/10]; Available from: <http://www.jisc.ac.uk/whatwedo/topics/mobilelearning.aspx>.
84. Hodges, H., *iLearning with iTunes U*, in *RSC Wales Teaching and Learning Blog*. 2009.
85. Dempsey, L., *The amplified conference*, in *Lorcan Dempsey's Weblog*. 2007.
86. Naismith, L., et al., *Mobile technologies and learning*. 2004.
87. Warwick, C., *Round table discussion on JISC VREs, their users and the use of Web 2.0 Technologies - Claire Warwick*, in *The Influence and Impact of Web 2.0 on e-Research Infrastructure, Applications and Users*, Edinburgh, Editor. 2009.
88. Sadler, D.R., *Formative assessment: revisiting the territory*. Assessment in Education, 1998. **5**(1): p. 77-84.
89. De Roure, D., *Round table discussion on JISC VREs, their users and the use of Web 2.0 Technologies - Dave De Roure*, in *The Influence and Impact of Web 2.0 on e-Research Infrastructure, Applications and Users*, Edinburgh, Editor. 2009.

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90. Morisey, M., *Could Google Wave hype kill its own potential?*, in *Enterprise IT Watch Blog*. 2009, IT Knowledge Exchange.
91. Elluminate. *Elluminate*. [Last Accessed 07/01/10]; Available from: <http://www.illuminate.com/>.
92. Meyer, J.H.F. and R. Land, *Threshold Concepts and Troublesome Knowledge (1) - Linkages to Ways of Thinking and Practising*, in *Improving Student Learning - Ten Years On*, C. Rust, Editor. 2003, OCSLD: Oxford.
93. Vygotsky, L., *Mind in Society*. 1978: Harvard University Press.
94. University of Strathclyde, *BILLS: Benefits of ICT Investment - Landscape Study: An Evaluation Framework and Toolkit*. 2008.
95. JISC infoNet. *JISC infoNet - Impact Calculator*. 2009 [Last Accessed; Available from: <http://www.jiscinfonet.ac.uk/records-management/measuring-impact/impact-calculator>].
96. Vander Wal, T., *Folksonomy definition and Wikipedia*, in *vanderwal.net*. 2005.
97. ECC. *HERA*. 2010 [Last Accessed 31/01/10]; Available from: <http://www.ecc.ac.uk/products/page.php?page=1>.
98. Hay Group. *Job evaluation: A consistent, objective framework*. 2010 [Last Accessed 31/01/10]; Available from: <http://www.haygroup.com/uk/services/index.aspx?id=2424>.