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Chapter I
E–Research Collaboration, Conflict and Compromise

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ABSTRACT

In this chapter, we consider two multi-institution, multinational education research projects in Europe that used a variety of technology to facilitate online collaboration as virtual communities of practice. While judged as successes by their funding bodies, the projects both exhibited symptoms of conflict that were subsequently resolved. We apply a personal inquiry technique and draw on situational analysis to identify and explore the conflict resolution processes associated with issues of leadership, organization, and technology in e-research. We contend that the communication technologies themselves must support the development of a collaborative community; and that the social, technical, and cultural facets of electronic collaboration evolve integrally over time. We conclude by proposing strategies that may assist colleagues in setting up a successful e-research project.

INTRODUCTION

This chapter draws its empirical base from experiences on two multi-institution, multinational education research projects in Europe: DELFEE and EQUEL. These were undertaken largely online using a range of software. The projects achieved their overall objectives and were innovative in their respective approaches to electronic collaboration, but each took time to establish ways and means of working amongst team members. Areas of conflict included the choice of software platform, the language in which the teams communicated and the mechanisms for intersite communication. Interventions were necessary to resolve these areas of conflict.

Individually, project members were highly literate in electronic communication and had experience of successful collaborations in the past. In these new e-research groupings, however, there were unanticipated barriers to realizing the organizational synergy offered by electronic collaboration across educational institutions. A previous examination of the features of these projects explored the extent to which they mirror global and national initiatives to introduce virtual research environments (King & Deepwell, 2006). Here we review and extend our thinking using personal inquiry and drawing on situational analysis to analyze the development of organizational synergies in both projects in terms of Leadership, Organization, and Technology.

We contend that the development of a community of practice (Wenger, 1998) has, in each case, enabled operational, procedural, and cultural norms to be established, and the consequential innovative, cross-border outcomes achieved. Furthermore, we believe that the communication technologies themselves must support the development of this collaborative community; and that the social, technical, and cultural facets of electronic collaboration evolve integrally over time.

Against the background of relevant literature, and the general context of the two projects, this chapter will:

1. Examine how the classic features of a community of practice translate to an e-research environment;
2. Explore the barriers to successful electronic collaboration and its development as a functional community of practice that may be pertinent to other e-research projects;
3. Discuss approaches to resolving the conflicting expectations, skills, and cultural norms of electronic collaboration team members, and thereby achieving synergies through technology;
4. Propose strategies that may assist colleagues in setting up successful e-research projects.

BACKGROUND

We first examine the term e-research, then the application of the concept of virtual communities of practice and, finally, the synergies that technology may offer.

Defining E-Research

When we set out to understand the difficulties we had encountered as researchers on the collaborative projects described in this chapter, we found a vast raft of literature concerning computer supported cooperative working, e-research and virtual research environments (King & Deepwell, 2006). We saw the term "e-research" used to define the information and communications technology infrastructure and processes developed to support collaborative virtual research, as well as the research itself. The UK's Joint Information Systems Committee asserts that e-research extends the term "e-science" to encompass other nonscientific disciplines and smaller scales of collaboration (Joint Information Systems Committee [JISC], 2007a), even including researchers "wishing to collaborate more effectively with a handful of colleagues world-wide in the same field of interest" (JISC Support of Research Committee, Virtual Research Environments Working Group [JCSR VRE], 2004, pp. 2). In addition to data manipulation and analysis which are essential to e-science, research activities which information and communications technology might integrate include "marshalling of resources, scholarly discourse and publication, and the creation and maintenance of collaborations, across disciplines, institutions and countries, including support for meetings and organizational processes" (JCSR VRE, 2004, p. 3).

Paradoxically, there is a competitive drive between nation-states to develop information and communications technology infrastructure to support their own e-research and e-science. JISC's activities are part of a well-developed UK

strategy (JISC, 2007b), while in the USA, the National Science Foundation (NSF) continues to invest in "cyberinfrastructure" to enable effective super-computing global collaborations in, for example, astronomy and biomedical research (National Science Foundation [NSF], 2003). A similar strategic push is seen in Australia (E-research Coordinating Committee, 2006). In Europe, there is now a move to transcend national barriers, at least for large-scale collaborative e-science, through the e-infrastructure initiative (Leennaars, 2005). Schroeder (2007) notes the contradiction between the global promotion of e-research, and apparently nationally self-interested developments. He also highlights the complications arising from commercial involvement: while technical e-infrastructures become more robust, tensions are emerging over the extent to which elements will be open as opposed to proprietary. The costs of engaging with proprietary software have historically been problematic for academic researchers as exemplified by our case studies.

Within our own sphere of interest, e-learning Sakai (http://sakaiproject.org), is an open and global initiative which integrates teaching, learning, and research collaboration. In the UK, Sakai is being trialed as a virtual research environment by a number of funded projects, to some effect (Rimpiläinen & Carmichael, 2006). As early adopters of online learning and enthusiastic users of virtual learning environments, we understand why our case study project teams tried to adapt learning environments into research environments. The advantages are clear: a virtual learning environment is Web-enabled and supports anywhere, anytime, and increasingly, any device access; a virtual learning environment is designed to provide document storage and communication facilities. Furthermore, use of an existing virtual learning environment (or acquisition of a new virtual learning environment) can be offered as part of an institution's contribution towards the cost of setting up an e-learning research project. A virtual learning environment, however, is not

designed to support electronic project management and will inevitably be found wanting. As we demonstrate through our case studies, where the collaboration platform is found by team members to be inappropriate or difficult, it risks being rejected by them in favor of more familiar and less sophisticated software solutions, or the collaboration reverts to face-to-face encounters.

From our review of the current literature, we find that the two cases described below are far from atypical. Research projects continue to make do with a variety of ad hoc communication and data sharing technologies. Unaware of national and international e-research developments, many project teams rely on what is familiar, what is affordable, what project partners promote most volubly, and what is most easily available. Here lie many potential sources of conflict.

Supporting Synergy through Technology

The concept of a community of practice has been widely adopted in both commercial and academic spheres to describe the ways in which professionals work together to construct knowledge. Dubé, Bourhis, and Jacob (2003) consider that "virtual community of practice" is the most appropriate term for a distributed community of practice which communicates largely through information and communications technology. In a commercial setting, Smith (2005) prefers the term "communities of competence" and suggests that the drivers to their creation are globalization, the complex needs of projects in terms of specialisms and other resources, and the economic advantages of involving developing and other countries in manufacturing. Schroeder (2007, p. 2) considers, as do we, that "a more accessible technical infrastructure will produce more effective knowledge dissemination; and the opposite, a fragmented infrastructure with limited access will yield narrower social benefits and slow the advance of knowledge."

An e-research project represents a virtual community of practice whose aim would normally be to set, investigate, and attempt to answer particular research questions through cooperative knowledge construction. Virtual communities of practice occur in commercial, academic, and composite spheres (for example: Foth (2006); and Lawrence (2006)). As may easily be imagined, particular issues associated with virtual communities of practice primarily concern their geographic dispersion and dependence on technology to emulate face-to-face interaction. While it may be natural to assume that information technology and information systems should be able to assist communities of practice in sharing and managing their constructed knowledge, Grudin (2006) notes the many reports of information systems projects which attempted to capture the reified knowledge of communities of practice but which had limited impact, or, indeed, which failed. However, our growing familiarity with Web-based applications and their increasing ease of use suggest that virtual communities of practice will employ any suitable technologies to work around the short-comings of formal information systems and virtual research environments to encourage "contribution and discussion" (Rimpiläinen & Carmichael, 2006).

Wenger, in 1998 and subsequently, contends that full members of a community of practice are identified by their active participation in knowledge construction and their self-identification with the community of practice. The community of practice facilitates learning which enables its members to develop their sense of identity as practitioners. Here we encounter a difficulty, as individual academics have a wide variety of reasons for being associated with a particular e-research project and, while they may feel a sense of belonging, may have little reliance on it for developing their sense of identity. As may be seen later in our case studies, one reason for this is that an e-research project is likely to represent only one of many concurrent commitments undertaken by its team members who will tend to develop their academic identities through their everyday practice.

If we analyze the central aspects of Wenger's Communities of Practice in turn, we see firstly that a community of practice develops out of a sense of "joint enterprise." In e-research, this would normally be effected through the project we jointly undertake. However, only a subset of project team members will have been involved in designing the project proposal or developing the bid document which originally won the project funding. Furthermore, the different individuals, institutions, and specialisms represented may have different motivations or may attract different rewards for participating in the project. Hence, the team members are likely to start their involvement in an e-research project with differing levels of commitment, interest, and understanding. Again, as may be seen though our case studies, the sense of joint enterprise may never be achieved.

Secondly, according to Wenger, a community of practice develops and requires a "shared repertoire" of key concepts, tools, artefacts, and stories to communicate effectively. An e-research project may have very little time in which to establish this repertoire and multidisciplinary projects, such as that described by Lawrence (2006), face further difficulties when specialist terminology is not understood (or not recognized) by team members from other disciplines. Multilingual e-research teams are likely to experience further difficulties even where one language is selected for internal communication. Key concepts can be shared by careful selection and distribution of project documentation (by any appropriate means) to team members. Tools and artefacts potentially present technical difficulties because of the differences in information and communications technology platforms used by project team members in different institutions. Stories can be shared within an e-research project, but this requires a level of interaction beyond the purely pragmatic. Occasional face-to-face interaction may provide the opportunity for sharing (and creating) stories as is seen in our cases.

A third element which underpins a community of practice is the activity or practice which represents "mutual engagement." Project teams can make actual or apparent progress through independent task completion; however, collaborative knowledge construction requires that community of practice members interact, and here, the geographic separation between e-research team members creates barriers. Virtual collaboration can be achieved with the support of information technology—just as with co-located collaborators who exchange documents electronically. However, the lack of face-to-face interaction can result in misunderstandings, slow turnaround and poor social cohesion as is demonstrated by one of our cases. E-research project leaders must be alert to these potential problems and actively seek ways to minimize their impact.

A virtual community of practice such as an e-research project group has to make efforts to convert newcomers into "old-timers." Smith (2005) highlights the problems attendant on newcomers "who fail to make the transition from being an outsider to being accepted as active participants" (pp. 9). Inevitably, people will join the project partway through and find it difficult to establish themselves. While the lone researcher in an institution may find that a virtual community of practice enables them to overcome geographic exclusion, peripherality by reason of time-zone may be an unforeseen problem. For example, Hildreth et al. (2000) describe the exclusion of one community of practice member whose location in Japan meant that she was unable to take part in electronic meetings with other members based in the UK and USA because of the time differences. There is further potential for peripherality when some members of a research team are co-located and others are at a distance. There are opportunities for ad hoc exchanges and additional collaborations amongst those who are located locally. Indeed, research thinking may develop quite considerably off-line before reconnecting online with remote research colleagues.

Summarizing the findings of over sixty relevant references published between 1995 and 2005, Romano Jr. and Fjermestad (2006) present a table of opportunities and challenges faced by virtual teams. While their ten opportunities represent benefits to the speed, cost and quality of academic and commercial projects, their twenty challenges relate, not to technology, but to social interaction, morale, and project leadership. Dubé et al. (2003) go so far as to suggest that a "coach" might be necessary to overcome the challenges facing virtual communities of practice. Lesser and Storck (2001) and Gilchrist (2004) are among those emphasizing the importance (and the difficulties) of developing social rapport within a virtual community of practice. Foth (2006) reminds us that global communication mechanisms are just as useful for those co-located or closely-located as those widely separated, but that "research that situates itself within the nexus of people, place and technology has to cope with the complex sum of the individual characteristics that each variable brings to the study" (pp. 207). Finally, Sugden (2004) proposes a range of characteristics for an education research multipartner "Web," the most interesting of which would be the "means to recognize, highlight and resolve conflicts and tensions [since] rather than suppress[ing] this rivalry by holding it in place within a hierarchy, a Web pulls it out through engagement and involvement" (p. 116).

This analysis of communities of practice has served as a useful lens through which to view the challenges of virtual research environments. We will now go on to introduce our own case studies and frames of analysis.

E-RESEARCH COMMUNITIES OF PRACTICE

Introduction to the Cases

The first case study is DELFEE (Diffusion de l'Entreprise en Ligne pour la Formation profes-

sionnelle des Etudiants Européens, that is: Dissemination of the European Students' Online Training Company). This European Union funded project involved thirty-four individuals from thirteen academic and commercial partners in European countries including Bulgaria, France, Greece, Lithuania, Sweden and the UK. It ran from October 2003 until September 2005. Its purpose was to demonstrate a set of e-learning tools and employability-enhancing approaches with students from a range of higher education institutions using input from commercial companies. Virtual collaboration was supplemented by four full-group face-to-face meetings held over the two-year lifespan. One of the authors (King) acted as a passive project observer for part of the project and as an active project participant over a sixteen-month period, having access to project communication media throughout. These reflections and case study review were undertaken after the completion of the project using Web access, project documentation and personal notes taken in situ.

The second project is EQUEL (e-quality for e-learning). This European funded project brought together senior and junior researchers, and e-learning practitioners in universities from across Northern Europe. There were fourteen institutional partners, and over fifty individual members with varying involvement in the project. The project was organized into a project management group, seven special interest groups, a development team and an evaluation team. It ran from November 2002 to May 2004, and has successfully completed its objectives, reported and disseminated the findings. Further collaboration between many of the partners continues. The project sought to build greater understanding of e-learning practice and theories and to connect a network of researchers and practitioners. One co-author of this chapter (Deepwell) was a project member and special interest group leader throughout the 19 months of the project and participated actively in each of the three research environments. The analysis and

review here are based upon personal reflection, project documentation, and scrutiny of the Web spaces used to support the project.

Analysis Approaches

We examined our case studies' project documentation and communication trails using two complementary analysis approaches: personal inquiry (Mann, 2003), and the ordered situational map (Clarke, 2005). This enabled us to raise both low-level and high-level issues, and provided a framework through which to generate theoretical explanations from personal observations. Together these techniques helped us draw out those elements which concern Leadership, Organization, and Technology, and which are of particular interest here.

Personal inquiry was used by Mann (2003) to explore her experience of adult learning online. Mann's background as a lecturer, and temporary perspective as a learner, gave her insight into the alienation felt by online learners which she could feed back into her teaching and research. Similarly, we bring the weight of our prior experience to our perspectives as team members in order to learn from this critical reflection and to improve our own e-research practice. Our personal inquiry accounts are included in the appendix to this chapter.

Clarke's (2005) variant of Situational Analysis drew on the grounded theory of Glaser and Strauss of the late 1960s to enable the situation itself to become the focus of analysis. Situational Analysis encourages a deeper understanding of a case study through consideration of the many influences and facets that categorize that particular situation, providing a rich view of each project context. This allowed us to identify the most interesting characteristics (perceptions, interpretations and issues arising) which we consider below. Our original analysis was transcribed as "ordered situational maps" and is included in King and Deepwell (2006).

The Case of DELFEE

More detail is given in Appendix 1: A Personal Inquiry into the DELFEE Project.

Leadership issues observed in these descriptions of the DELFEE project included the number of stakeholders, the variety of management structures, and numerous areas of conflict. The personal inquiry account highlights the difficulty of establishing and sustaining a leadership role in a cross-institution academic collaboration. The DELFEE project leader ensured that the project framework was agreed and reporting processes were made clear, but did not attempt to communicate or maintain a vision of project success. As is usual within this sector, administrators were employed to chase up defaulting participants' reports, rather than the project manager priming partners to achieve well ahead of a target date, and then using the associated interaction to enthuse and motivate team members.

Organizational issues presented by the DELFEE project included the essential complexity of the project due to its spread across time-zones and national borders; the separation of the roles of project manager, facilitator, and administrator; and the pressures on individual team members to fulfill project manager expectations while maintaining their fulltime role in their home institution. Face-to-face six-monthly meetings enabled the project team to gel, to communicate their mutual expectations and to make progress.

The effect of project conflict on individual team members varied depending (for example) on their attitude to the project, their experience of similar projects, and their ability to influence project direction.

Technical issues noted for the DELFEE project included unreliable electronic communications, and software system incompatibilities amongst the collaborating organizations. The decision to use a particular virtual learning environment as both a delivery platform and as a virtual research

environment was financially and technically justifiable, but remained an area of debate. This environment was a compromise solution which failed to facilitate researcher collaboration. Even if set-up optimally and made available from the start, it would still have proved an inadequate research environment. Recent upgrades and partner software integrations have addressed some of its shortcomings so that voice and video interaction, and the use of wikis and blogging to capture reified knowledge are now possible, but the functionality to plan and manage a multipartner project is still lacking.

The Case of EQUEL

More detail is given in Appendix 2: A Personal Inquiry into the EQUEL Project.

Leadership issues which were observed in these descriptions of the EQUEL project relate to the devolved management of the project, mix of research experience, and limitations of time. The various special interest groups and other teams working on the project combined those who had worked together previously and newcomers to the group. There was an ideological rationale for using a particular model of virtual research environment, but the decision about who should develop this was taken prior to the start of the project and not fully explained, even when there were delays in delivering a usable platform. For a time during the project, what should have been a joint enterprise became a conflict over virtual workspace. The main project evaluation team was not directed to assist in surfacing issues around the virtual research environment, which might have helped resolve conflicting perspectives. Action was eventually taken by a hastily formed subgroup in the form of an internal heuristic evaluation of the virtual research environment, which recommended changes to the functionality. These could not be done within the available timescale, and the decision was taken to recreate

the research community in a more user-friendly environment.

Organizational issues presented by the EQUEL project include the absence of involvement of the developers of the virtual research environment at the outset. The development team was unable to attend the face-to-face meetings, and there was no virtual evidence of their participation with the emerging research community of the project. A communication protocol was established initially, but this needed to be adapted as the medium switched to two other technological platforms. The central issue of public/private space for the project was an ongoing debate, which impeded use of the virtual research environment. Members of the project were freely discussing, sharing research strategies, and were careful about storing research data in areas known to be private, but were unsure of what to post in the public spaces, and where the responsibilities for this lay. The special interest groups worked as semi-independent teams, and largely online, although dispersed across Europe. This made them effective in terms of output, and good use was then made of the face-to-face meetings to work to develop synergies across the teams.

Technical issues noted for the project are centered on the three platforms used as research environments for the project. With seven special interest groups, some whole project areas, events, and shared resources, the information design of the virtual research environment became critical. The socioconstructivist architecture of the virtual research environment portal had previously been applied in the context of largely co-located full-time research students. The research community for the EQUEL project, on the other hand, comprised researchers, academics, and practitioners working part-time on the project, and used to collaborating online with their own preferred tools. Hence, there was some resistance to this imposed model of collaborating. Added to this was the increasing pressure to become more of an externally facing Web site.

In the end, the final environment was an open-source virtual learning environment which was both simple and easy-to-use, provided sufficient distinction between private and public areas, and offered a wide variety of communication and information handling tools. This final move enabled the co-construction of a bibliography and other shared resources within the discrete areas of the Web site, as well as synchronous and asynchronous collaborative opportunities.

SOLUTIONS AND RECOMMENDATIONS

Leadership

For much of the time, an academic works autonomously, creating research outputs, acting as the facilitator of learning for their students, and interacting with many different administrative individuals. Governance within an academic institution is provided by committees and steering groups while professional bodies may exert external influence. An individual academic often has greater commitment to their discipline than to their home institution (Becher & Trowler, 2001). Within research groups, leadership may be embodied in an individual, but more often, a special interest group will determine the direction of activity. The growing trends towards managerialism and performativity in the UK have resulted in ever-increasing measures of academic productivity (in terms of research outputs), more reporting and more bureaucracy, but not necessarily any more leadership.

In bidding collaboratively for education research projects, individual academics from a variety of institutions are acting pragmatically: by demonstrating their diversity, they have a better chance of winning funding. Thus evolved the two case study projects. The project managers here were those best able to put a winning bid together since a winning bid is often founded on a track

record of successful bids. Hence, the more projects you have won in the past, the more you will win in the future (Becher and Trowler (2001), drawing on Merton, call this concentration of resources the "Matthew effect"). The ability to win bids does not necessarily align with strong leadership skills, and, as we have seen, such skills may not be thought appropriate in an academic context. The DELFEE project manager exemplified academic project leadership: she was skilled at bidding, reporting, managing finance, and setting a tone of collegial enterprise, but as we have seen, she was not a leader in the traditional sense. The EQUEL project manager similarly had a strong academic foundation. She also had a strong egalitarian ethos and loyalty to the virtual research environment development team. Leadership was shown by acknowledging the difficulties and enabling a change to occur.

Both projects would have experienced less conflict or earlier conflict resolution, if the project manager had established electronic communication mechanisms early on and kept them under review, neither being swayed by personal platform preferences, nor overly influenced by vocal minorities. While the importance of responding to the project funding body's requirements is recognized, we contend that the project manager's focus should be on achieving innovative outcomes and facilitating collaborative efforts. This would be an appropriate leadership role in this context.

Organization

The necessity to involve geographically dispersed partners in European-funded projects—and the pressures to conduct this work alongside other commitments—means that interorganizational collaboration initiatives are inherently difficult to manage. We concur with Lawrence (2006), who recommends that e-research funding bodies should supply guidelines on the frequency of physical meetings, the overheads for multisite project management, and their necessary budget

implications based on lessons learned from successful projects. We contend that electronic project management approaches can be effective, but that they take time to establish in everyday practice, imply a considerable management overhead and, perhaps, would gain greater acceptance if they were modeled on Internet social software. Online research collaboration works effectively for smaller teams of researchers, who can share and develop their work online and build synergies with related teams at face-to-face meetings.

Technology

Our cases suggest along with Fischer (2004), that lone and small-group researchers can realize benefits from electronic collaboration and that, since it is largely an attitude of mind which interprets opportunities as barriers, this can be changed. It is also worth noting that the ideologies underlying software design will make it more, or less, acceptable for members of virtual communities, and these ideological assumptions need to be made explicit. We consider that technical hurdles should be minimized for novice members of a virtual community of practice. Increasingly, research team members are expected to be able to use information and communications technology almost intuitively, yet researchers may have neither the necessary skills nor the time to learn to use new software unaided.

Rather than introduce additional technology, e-research projects should "find ways of using existing tools more effectively" (Lawrence, 2006, p. 408), such as agreeing how to indicate urgency in an e-mail message. Rather than invest in new software, a practical compromise may be to use e-mail system add-ons to arrange meetings and to remind project members to exchange status reports. Grudin (2006) suggests the use of project Weblogs to replace certain categories of e-mail and to create a project archive, but highlights the need to structure and manage them, while Foth (2006) suggests that a discussion board can serve as an online community's "memory."

FUTURE TRENDS

We indicated earlier that virtual research environments have evolved from virtual learning environments and are indeed suffering from the criticisms leveled at virtual learning environments of being too monolithic and unwieldy for the purposes to which they are being put. The shift towards new kinds of environments is fuelled by the popular demands of e-learning users for decentralized, robust, and community-based constructivist models of engagement (Weller, 2007). Our analysis of leadership, organization, and technology with respect to the two e-research project cases has highlighted the significance of the following aspects of virtual research environment design:

1. End-user involvement in the ongoing development of a working virtual research environment (joint enterprise);
2. The establishment of protocols and job roles (shared repertoire);
3. Opportunities for working across functional boundaries, or task groups (mutual engagement).

The implementation of this requires projects to build in user analyses early on in the project. Even where the needs of the project members can be articulated in advance, their preferences and behaviors will vary considerably. By considering these, project leaders can minimize the likelihood of disengagement with the chosen research collaboration tools. It is likely, therefore, that adjustments to any research environment will need to be made during the functional life of the project. This is, therefore, our case for compromise.

FUTURE RESEARCH

We are writing at a time of continual change and development in information and communications technology support for e-research. A difficulty with major national and international virtual research environment development is that they become so vast that they cannot respond flexibly to changes in technology and society. The lack of a widely recognized solution to virtual collaborative research needs has resulted, and continues to result, in the use of unsatisfactory information and communications technology provisions which create barriers to effective cooperative work. End-users respond by rejecting these systems and/or by adopting ad hoc compensatory practices. Meanwhile, in their everyday lives, many academic staff have begun to use the intuitive social software, repositories and libraries that proliferate on the Internet. While these kinds of environments have potential for use in e-research, their transience and lack of centralized control is at odds with the conventions of funded research and the search for a more long-lasting solution continues.

CONCLUSION

Our deliberations for this chapter have led us to promote compromise as the means of overcoming barriers in complex e-research projects. Our insights into the three frames of our analysis have opened up possibilities of improvement.

The personal inquiry accounts reveal the emotional responses to working in e-research environments that do not meet expectations; the situational analysis, on the other hand, made explicit the political and contextual factors at play. The analysis of two e-research projects has drawn out similar issues with regard to leadership, organization, and technology. Each domain requires attention from all project participants in order to identify and implement realistic improvements in project functioning. Mechanisms for review within the project cycle are imperative and need to be carefully managed.

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KEY TERMS

Collaboration: Working together; a work group with shared objectives, particularly where the collaborators bring different skills, experience, and/or resources to a project.

Community of Practice: Term coined in the 1980s through the work of Jean Lave and Etienne Wenger, and John Seely Brown and Paul Daguid encompassing the notion of a normally professional, social grouping whose members work actively on a shared interest, solving shared problems, sharing and constructing knowledge over time.

Electronic Project Management: Processes employing a virtual infrastructure to plan, manage, and control the activities of a project team which may be geographically and/or temporally dispersed.

E-Research: Collaborative research undertaken virtually with the support of information and communications technology.

Reified Knowledge: Development of the concept of reification explored by Wenger (1998): knowledge which has been captured in some way; for example as a procedure, a form, a set of instructions, a computerized process. For a virtual community of practice, examples might be found in members' wiki, discussion forum, or blog entries; in diary management procedures; or in project work-effort recording systems.

Virtual Learning Environment: A software system which enables teachers and learners to communicate, and which provides support for course management and assessment.

Virtual Research Environment: A software system which enables researchers to communicate and which provides support for their collaboration.

APPENDIX 1: A PERSONAL INQUIRY INTO THE DELFEE PROJECT

"Attending the inaugural project meeting in Paris, I felt overwhelmed by the complexities of the project—so many partners, such ambitious objectives, and such limited technical infrastructure. The project manager was pragmatic: she focused on financial reporting procedures, aware from previous European Union funded projects that it was essential for all participants to get this right. The presence of a bilingual facilitator enabled the two-day meeting to progress largely in French with participants from Sweden, Bulgaria, Lithuania, Greece and the UK keeping up as best they could. I had read the full bid, in French, and a translation of its core aims, yet could not grasp how these related to the activities being discussed. I was obsessed by a line I had read in the bid: that the project would take online training into prisons, amongst other new environments. This daunting prospect never materialized, project dissemination subsequently took place through traditional means. At the time however, there seemed no opportunity to resolve my confusion. Another worry was that my expertise in the application of [particular virtual learning environment] appeared to be irrelevant, apparently all that was wanted from my institution were staff and student training materials for [particular virtual learning environment], not advise on how to adapt it to particular uses.

"The meeting, however, achieved the essentials—the dates and locations for the three subsequent full-project meetings were agreed, membership of three sub-committees was established

and [particular virtual learning environment] was confirmed as the project communication environment with module Webs to be created for project management, development, demonstration and dissemination. The intervention of my UK colleague (showing how a user could set their options to display menus in either French or English) was critical in enabling this proposal to be agreed. Alternative suggestions of collaboration software were ignored or rejected. Subsequently, the project manager, facilitator and administrator used e-mail rather than [particular virtual learning environment] for most project communication, thus setting a precedent of circumventing the core collaboration environment.

"The good-tempered and hospitable atmosphere of that meeting disguised the difficulties that subsequently dogged the project—the host team, successful in winning this funding on the back of a previous EU project, were new to [particular virtual learning environment]. Their technical team was slow to set up user access for participants and much of the impetus of the first meeting was lost. Team members were unsure who should take the initiative and drive forward progress. Between the six-monthly meetings, it was difficult to focus on the project. Other, local priorities were much easier to respond to and tended to take precedence, so work on the project proceeded spasmodically. No wonder the project manager felt "all alone" when she visited the Discussion Forums.

"Without the face-to-face meetings, I am convinced that the project would have foundered. While the discussion fora remain largely void of useful academic exchange, the many photographs which were posted of these events reveal a well-founded and developing community of practice. Individuals from different organizations are seen talking together, laughing and working cooperatively. The effort team members put into attending, recording and sharing records of these events went far beyond the minimum necessary. While I never felt part of the project, other project participants

clearly did feel part of this community of practice and the social bonding created at and after these events was significant. One team member wrote that we should 'maintain this open and altruistic spirit, since it is through turning towards others we become ourselves'."

APPENDIX 2: A PERSONAL INQUIRY INTO THE EQUEL PROJECT

"The e-learning platform first used by the project was a relatively simple discussion board. Access was provided directly after the first face-to-face project meeting. For me, this had the advantage of being easy to use and was an opportunity to begin to share some ideas and discuss what we were intending to achieve within the sub-group I was active in. Contributions were lively, although there was a sense of anticipation, of a "better" research environment which would be launched imminently. The site was being built by a leading research team in Europe.

"When the site was opened to the project members, however, there was an initial sense of dismay—followed by a slow and tentative start to the postings. The screen looked chaotic, text-heavy and with little discrimination between public and private areas. I found that my attention on screen was divided amongst many information windows, some of which were irrelevant but took up a large part of the screen, others of which were vital, but shown in compressed form. There were some elements that I welcomed, for example the "shout" box where any of us could post a quick hello to another project member we found online at the same time as us. Other elements, I found difficult to embrace, such as the repository for file storage, which was not sorted intuitively, could not be edited directly and was not linked to any discussion tool. On further investigation, I found that there were some highly attractive features, such as the ability to "subscribe" to a discussion topic and thereby receive messages in my e-mail inbox with the option to reply straight back into the discussion topic. This is clearly not a new development in technology, so I was left wondering where the technology innovations lay in the virtual research environment system. The site featured a wiki, chat, who's online, file repository, public Web pages, each with some necessary user instructions. Whilst as a member of a research project, I and others in the team were willing to learn how to use the system, it rapidly became clear from the lack of responses to postings that many others had "been put off once" [e-mail correspondence] and were reluctant to engage again.

"Comparison virtual research environments developed by the research team were based around a large and very active community of e-researchers. The researchers in the project in this case, however, were largely teachers who were interested in pursuing research into their e-learning practices and had a considerable degree of experience of using virtual learning environments and other technologies for learning. Our interests were more about the learning processes than the technical issues. My own expectations of a virtual research environment were that it should be intuitive in the first instance, enabling text and images or video clips to be incorporated relatively simply into communication. There were additional steps required of the users, which I reported in a chat about the system design: "you can't easily jump out of typing a forum message to check the URL of the repository item. It is laborious." [extract from chat log]. Reconciling these expectations with the functionality of the virtual research environment was difficult. The separation between public, private (project-wide) and private (sub-group) spaces is a distinction that many virtual learning environments have tackled with varying success. I therefore welcomed the final decision by the project, prompted by an internal evaluation of the virtual research environment, to move the project to a virtual

learning environment with virtual research environment capabilities and pursue the research from there. Within this new VR/LE I was in the end able to conduct productive and collaborative, synchronous and asynchronous work within the research team."