EXPLORING THE NOTION OF 'CULTURAL FIT' IN GLOBAL VIRTUAL COLLABORATIONS

By Tony Clear

Working in global virtual teams (GVTs), raises a number of issues variously relating to technology, tasks and people working in their different locations and institutional contexts. Achieving alignment across these elements can be challenging. Collaborative Technologies inherently require the participants to work in collaboration and globally distributed settings can place strain on these arrangements. An added complication comes from the need to work not only across boundaries of time and place but also across cultures. This paper reports the findings from a study of a global virtual collaboration between three universities in New Zealand, Sweden and USA. It discusses the complex and multi-layered concept of 'culture' and presents a means of mapping "cultural fit" across a global virtual team context.

1 INTRODUCTION

The research reported here originates from a global collaboration conducted in 2004 between three Universities: AUT University, New Zealand; Uppsala University Sweden; and St Louis University, St Louis Missouri, USA, as part of a broader action research programme into global virtual collaboration [3].

The collaborative process was carried out with the support of a Web based environment, consisting of two primary components: the virtual learning environment at AUT - "AUTOnline" based upon the Blackboard™ commercial platform; and a collaborative database custom built in Lotus Notes. The Web based environment was designed, set up, and administered at AUT New Zealand.

Students were assigned to Global Virtual Teams (GVTs) and required to participate in a collaborative process that consisted of two phases: Icebreaking and Group decision-making. Each GVT had access to their own asynchronous (discussion forums) and synchronous (chat) facilities, and to file-sharing and individual homepage features. They also had access to a collaborative database VTeam that was custom-built to support and record their team decision-making process and their evaluations of the exercise.

The Icebreaking phase was designed to allow GVT members to get to know each other and to establish their group dynamics. The GVTs were given a choice of communication means as well as the options of either choosing a team leader or deciding on a self-managed team. The second phase of the collaboration involved group decision making related to a common task. Each GVT was expected to identify, upload and evaluate a selection of Web sites related to collaborative technologies. They were required to discuss the web sites based on a suggested evaluation framework and to reach group consensus on the final ranking of the sites. The second phase was to be carried out in the custom-built collaborative environment. The collaboration took place as one component in each of the three courses, with separate assessments at each site, over a duration of approximately six weeks.

During the process of preparing for the trial, three main tiers emerged in the overall structure: a) students organised in Global Virtual Teams, with some having an additional local team structure; b) faculty members in their multiple roles of lecturers, coordinators and facilitators; and c) institutional infrastructure for both IT and logistical support.

The subsequent doctoral study by the author [5] investigated the work of the facilitators of the collaboration and the activities of "technology-use mediation" in which they were engaged. It represents a longitudinal study of a global virtual team involving the work of a group of professionals within a distributed field setting.

Global collaborations in educational settings have tended to focus on the activity of the students in their global virtual teams (GVTs). Yet, in addition to these students working directly within their teams, a number of further actors perform support roles through a set of 'backstage' activities. While crucial to the success of GVTs, their roles and activities in establishing and maintaining alignment between the sites have been little researched.

Some of the insights gained from our GVT research at AUT, were presented in a panel session at St Louis University in 2005. Notable elements of these global collaborations have been firstly bewildering complexity, with the demand for extensive planning & coordination before and during the collaboration; secondly, considerable involvement and dependency upon technology, resources and parties external to the group. Issues encountered in our 2004 collaboration traversed a broad set of actors, activities, roles and tasks. A small subset of the issue presented includes: aligning courses, schedules, sites; designing a suitable collaborative task; agreeing task and trial design; confirming local and joint assessment components; establishing technology and infrastructure

across sites, building trust; accommodating different time zones, maintaining awareness of activities at the other sites; reliance upon technical support; motivating and reinforcing forms of technology use etc. Also noted was the fact that much of this activity remained unexplored in the research literature, although being encountered daily by practitioners.

The doctoral study then, has resulted in a *Theory of Collaborative Technology Fit (CTF)* which provides both a theorization and a diagnostic tool for potential use by a variety of Global Virtual Teams. One critical component of the theory includes the elusive 'dimension' of culture, which in itself is something of a misnomer given the multi-dimensional nature of 'culture' as a phenomenon [12]. The term 'culture' in this context represents a broadly defined notion representing "the collective programming of the mind which distinguishes the members of one group or category or people from another" [Hofstede, 1991; cited in 13 p.27]. Defining 'culture' as merely linked to nations and nation states however has been criticised by Myers & Tan [13], who regard culture not only as "contested temporal and emergent" but as "complex and multi-dimensional and can be studied at many different levels" [13, p.29].

Nonetheless for computing educators and practitioners the globalisation of our profession and our workplaces places the element(s) of culture squarely in the midst of the issues we must deal with on a daily basis. As noted in [4] varying configurations of people, technology, institutional and cultural elements are difficult to combine effectively to produce predictable outcomes in globally distributed educational collaborations. In this paper the aim is to illustrate the way in which the cultural 'dimension' operates in achieving alignment of collaborative technologies in global virtual collaborations.

This paper first presents some of the theoretical background then reports selected findings from the study. It discusses the complex and multi-layered concept of 'culture' and presents a means of mapping 'cultural fit" across a global virtual team context. It concludes with a brief discussion of current work and future directions for the research.

2 THEORETICAL BACKGROUND

The theoretical basis underpinning the notion of 'cultural fit' in global virtual collaborations, links the people, technology and institutional aspects and has its origins in a structurational perspective on Information Technology.

2.1 Technology as Structure

This perspective on technology differs notably from the commonly received view of technology as "engineered artefact, expected to do what its designers intended it to do", typically substitute for labour or perform as a productivity enhancement device [14]. Regarded through the contrasting "ensemble" perspective of "technology as structure" [14], Information Technology (IT) is set more firmly in a social context. Under such a model the 'structures' or features designed into the technology serve to shape human action, but in turn human action shapes the technology itself. Thus, we have a view of IT and human action as mutually shaping activities in their social and institutional contexts. For computer scientists this could be seen as a form of social recursion with IT firmly implicated in the process.

The benefit of this perspective is its ability to go beyond the 'tool' view, where technology can be simply applied instrumentally and deterministically to achieve given goals. Particularly in the case of collaborative technologies and contexts, the simplistic 'tool' model of IT has run its course and does not contribute usefully to our understanding.

The subtle evolution of patterns of technology use can be somewhat unpredictable and contradictory, and what Orlikowski has termed *technologies in practice* [15] may differ widely from the designers' original intentions. This phenomenon was noted by Barley in a study where he found paradoxically differing patterns of use in two sites implementing radiographic machines, "identical technologies can occasion similar dynamics and yet lead to different structural outcomes" [1, p.105].

In this paper the aim is to illustrate the way in which the cultural 'dimension' operates in achieving alignment of collaborative technologies in global virtual collaborations.

In their theory of adaptive structuration (AST) DeSanctis & Poole [7] applied these insights to Group Support Systems (GSS), where they noted that differing patterns of use evolved and stabilised over time, as technology structures were used or "appropriated". Through the process of appropriation "a group judges whether or not to use certain features of an IT product such as a GSS, directly uses (reproduces) a structure, or blends or interprets a structure in some way" [7, p.129]. These "structures become stabilised in group interaction if the group appropriates them in a consistent way, reproducing them in a similar form over time" [7, p.129].

2.2 Metastructuring

These actions of "structuring" are actions of direct technology use, which serve to shape the evolving patterns of *technologies in practice*. However complementing these processes of structuring are further more indirect processes which have been termed "metastructuring" [16]. These further processes involve the work of indirect users who mediate the use of technology and work to shape consciously the technology use of others. For instance the 'backstage" activities and roles performed by such parties as system administrators; trainers; configurers of software applications such as wikis, virtual learning environments, listservs, video conference rooms etc. Without the processes of *establishing* the technology, *reinforcing* and *adjusting* its use and *episodically changing* the technology by reconfiguring or sig-

nificantly redesigning it, the desired patterns of use would not evolve to suit the circumstances. Even with such technology-use mediation, the eventual technologies in practice may be far from those desired.

The study upon which this paper draws [5] developed the concept of a *metastructure* as an analytical unit by which to investigate these processes. A 'metastructure' was defined as:

> *a mediating institutional, cultural, or technology structure, which serves to shape [collaborative] technology use. (p.126)*

Some examples included "global virtual team; local team; wiki; firewall; global email list; virtual learning environment, online questionnaire, discussion forum, human subjects ethics review process etc." [2].

3 CULTURAL FIT

Methodologically the study applied various forms of analysis. In particular it applied grounded theory [8] and conducted structurational forms of analysis to investigate the ways in which collaborative technologies were appropriated [17, p. 1366]. Space precludes elaborating these methods fully here (cf. [5, p. 79ff.] for further detail), but the empirical data (email messages, documents, online postings etc.) investigated during the analysis were essentially segmented into time bound episodes.

The study looked at the degree to which there was alignment or 'collaborative technology fit' across the three sites in a given context, by selecting a time window for analysis and a relevant metastructure and then mapping the degree of alignment across six selected dimensions of 'collaborative technology fit' (which had arisen from the study), on an illustrative radar chart. The notion of fit here is similar to that proposed in [19] where fit consists of "adherence to a specified profile". The scale here for each dimension ranges from full 'collaborative technology fit' (i.e. there is full support on that dimension for the collaborative activity) to no 'collaborative technology fit'. The six dimensions were:

> Technology; Institutional; Individual actions; Technology-use mediation (TUM); Technology use; Cultural

These radar charts graphically portray an assessment of the extent to which a degree of alignment or "collaborative technology fit" has been achieved on each dimension. The scales on the diagram represent a continuum from zero fit to full fit, where full fit reflects an ideal situation.

More work remains to be carried out to confirm the scales applied in assessing the degree of CTF. Currently the scales represent a continuum from 'no collaborative fit' to 'full collaborative fit'. Intermediate points from 'no CF' have been defined as 'limited fit', 'moderate fit' and 'partial fit'. The precise terms may be argued with, but the assessment at this stage consists of making a personal judgement of fit on each dimension based upon evidence from the the data and experience. This of course does not yet support common understandings and consistent application of the CTF analysis across different raters.

The application of the approach is demonstrated below firstly against an educational example of lack of collaborative technology alignment drawn from the literature, and secondly using data from the study [5] exemplifying an extension of the cultural dimensions of the CTF analysis.

3.1 The *CoWeb* Case

An illustration of this visual mapping process showing how the *CoWEb* wiki [9] was differently appropriated in separate course contexts (as opposed to collaborative sites) may be useful here. While the *CoWeb* wiki has been used at Georgia Tech. across campus widely and successfully in many different course contexts, it has notably failed in some cases. The summary and mapping below, adopting *CoWeb* as the technology metastructure in focus, and based upon data from [9] illustrates the dynamics in operation across the six dimensions. Three different groupings used *CoWeb* for their classes: Chemical Engineering and Mathematics (Chem), Computer Science (CS), and English Composition (Engl).

On the ***Technology*** dimension a purpose designed equation applet had been incorporated into *CoWeb* for the first group; a set of discussion pages for a mid term exam review was provided within *CoWeb* for the second group; while, threaded discussions for collaborative close reading were made available for the third group.

Institutionally the first two groups had a highly competitive "curved" class so students lost out if their peers did well, whereas that was not the case for the Engl. students.

Individual actions varied across groups: not one Chem. student used the equation applet, although the faculty did and praised it; 22 of 340 CS students posted to *CoWeb*, some faculty postings were highly critical of students; Engl. Students annotated original source text phrases, created new annotated pages, and performed significantly better with more variation than a non *CoWeb* comparison section.

TUM activity for the first group consisted of *CoWeb* tailored for ease of use and administration, and a purpose designed applet for equation posting to the web; for the second group *CoWeb* was tailored for mid term exam review, and workshops, support documentation, plus *CoWeb* hosting offers were made; for the Engl. class *CoWeb* was introduced with a hands-off approach, they did little to train or guide for faculty in use of *CoWeb*. The teacher was a first time user of *CoWeb*, conceived online assignments for the class, was the first to use close readings in *CoWeb*, and the teacher imported the concept of web crossing chat sessions into *CoWeb*.

On the ***Technology-use*** dimension the first group used *CoWeb* and only faculty used the equation applet; the second group used *CoWeb* with mid term exam review postings, the third group used *CoWeb*, collaborative close reading threaded discussions, annotated phrases & new pages. This contrasted with the Web Crossing chat comparison section (off line essays and close reading in newsgroup style discussion board).

The ***Cultural*** dimension showed marked differences between groups. 40% of the Mathematics students accepted zero on their assignment rather than collaborate with Chemical Engineers, The student perception was of single answer to questions so there was no need to collaborate. The students actively avoided collaboration. Some faculty moreover favoured single answer questions at

Exploring the Notion of 'Cultural Fit' in Global Virtual Collaborations

continued

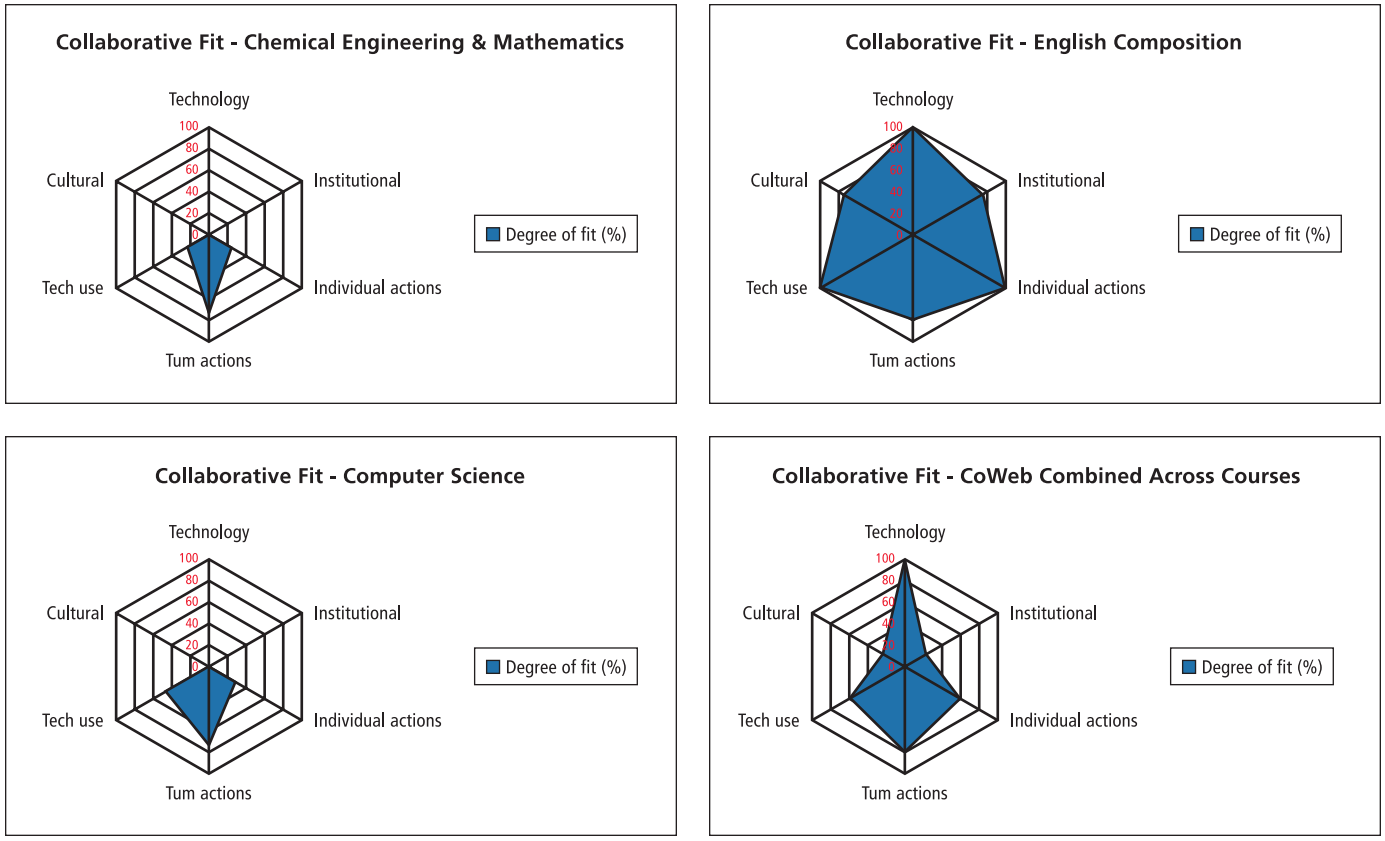

Figure 1: Radar Charts – *CoWeb* Misalignment – Lack of "Collaborative Technology Fit"

undergraduate level. For CS only 22 of 340 students contributed to discussion pages. Posting mid term review solutions was considered useful, but many students were confused or not confident enough. Faculty criticism of student postings was an inhibitor. It was not a help-oriented environment. There was no faculty take up of *CoWeb*, and therefore no models of how to collaborate or what to do in *CoWeb*. The students enjoyed collaborating in Engl., but the same students did not in calculus! Student perception here was of there not being a single answer to questions, and there was support for open ended discussion, so collaboration was valuable? The faculty valued collaboration (they had made prior use of web crossing for chat & discussion boards). *CoWeb* users were more positive towards collaboration than a comparison section (writing off line essays and close reading in a threaded discussion environment).

The dynamics in operation for each course (site) are portrayed in the radar charts of figure 1 below, depicting the six dimensions of 'collaborative technology fit' where the limited alignment of the highly competitive classes is apparent, with institutional, student and faculty cultures conspiring against a role for collaborative technologies.

3.2 Culture as a Phenomenon

As noted previously, definitions of culture are elusive. Yet as can be seen for the *CoWeb* case, culture is heavily implicated in the effective alignment of technology and people in institutional and (in the case of Global virtual teams) cross-institutional contexts. To delve further into analysis of the role of culture in global virtual collaborations, the notion of culture as multi-layered is helpful.

As Leung et al., [12] depict in figure 2, culture in operation can be conceived as reinforced through a "top-down bottom-up process" across different levels from the individual to the global.

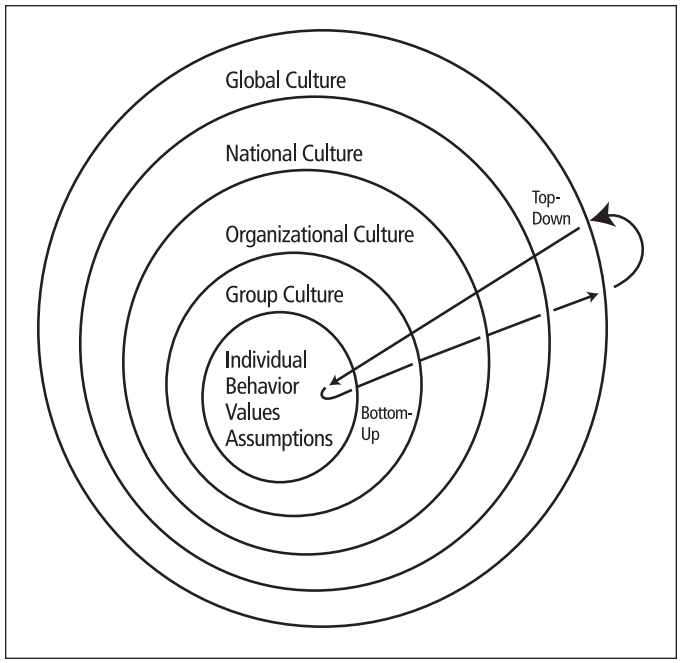

Figure 2: The dynamic of top-down-bottom-up processes across levels of culture (ex. [12 p. 363])

Weisinger & Trauth [18] add to this perspective with their notion of culture as "situated', where culture is:

> *"fluid, contextually dependent, and created by actors within a group who may hold conflicting assumptions and worldviews. In other words 'culture is what culture does'" [18, p.309].*

Borrowing upon these views, the Collaborative Technology Fit model was expanded to enable a deeper focus on the cultural aspect. This led to a multi-dimensional model of culture which retained the metastructure as the focus, but drilled down into additional layers or dimensions of culture itself. These dimensions could again be mapped to indicate the degree of 'cultural fit' [11]. The example below of the operation of 'culture' for an institutional metastructure of the "human subjects' ethics process" in a global virtual collaboration, comprised six elements, which had been theoretically informed by the above insights and empirically derived from grounded analysis of the data across episodes:

Individual action; International; National; Institutional; Professional; Student

My colleague did not have ethics approval so the collaboration could proceed only as a teaching activity and it could not lead to subsequent research publications based upon St Louis student contributions.

3.3 Human Subjects Ethics Process Case

To illustrate the operation of culture in a specific context of global collaboration, one example drawn from the empirical data within the study is elaborated below. One recurrent theme during the study of global virtual collaboration was the 'human subjects ethics process'. This operated very differently across the three sites and ironically proved a barrier to a model of teaching that is inherently research linked [3]. An initial mapping applied the six dimensions of 'collaborative technology fit' (as in figure 1 above) across the three sites in this case, and indicated that the 'cultural' dimension was implicated in a lack of alignment. The analysis of this process occasioned the need to investigate more deeply the several cultural layers in operation across the three sites, so that a clearer diagnosis of the inherent issues could be made.

The summary and mapping below, with the ethics approval process as the institutional metastructure in focus, illustrates the dynamics in operation across each site and the six layered cultural dimensions identified. More detailed supporting references for much of this historical and contextual material are given in [5, p.363ff.].

At the level of ***Individual actions*** the historical medical experiments of Nazi doctors operating under an aberrant regime had brought an awareness of the need for standards of medical ethics which researchers should be bound by. In NZ a more recent major scandal in a case of cervical cancer research had reinforced this awareness [10], and in the USA several questionable studies had caused some research institutions to lose their accreditation and access to federal funds for periods of time.

At the ***International*** level this had seen a culture of medical ethics treaties being instituted, which bound medical researchers and funding agencies across the globe.

At the ***National*** level in NZ patients' rights legislation had resulted and the Health research council had mandated a structure of ethics committees. In the USA the Public Health act and federal protection for human subjects legislation had been passed. In Sweden rather more recently, legislation had mandated medical research ethics committees.

At the ***Institutional*** level in NZ individual ethics committees developed their sets of regulations to govern research in the institution. In the USA Institutional Review Boards (IRB's) had been mandated for funded medical research, miscreants had caused some medical research to be suspended and IRBs developed their sets of regulations to govern research in the institution. In Sweden the scope of ethics committees at the institutional level appeared to be restricted to medical research.

At the ***Professional*** level at AUT University in NZ the regulations operated under a medico-legal paradigm, where prior approval had to be gained for all research activity in the institution. Pedagogical research and publications resulting from that were therefore constrained, although teaching activity was not constrained in this way. I had ethics approval so the collaboration could proceed and it could lead to subsequent research publications. At St. Louis in the USA similar constraints to AUT applied through their IRB. My colleague did not have ethics approval so the collaboration could proceed only as a teaching activity and it could not lead to subsequent research publications based upon St Louis student contributions. In Uppsala pedagogical research was constrained by a set of professional mores, so the collaboration could proceed as both a research and teaching activity.

At the ***Student*** level at AUT University in NZ the regulations required that participation in research be a voluntary activity on the part of the students, and informed consent had to be gained with the right to opt out at any time. Therefore we had to design an alternative assessment item to the collaboration should students opt out. At St. Louis in the USA since the students were participating in the course of instruction they had no such opt out route. In Uppsala the professional mores in operation meant that students could opt out of the research dimension of the course and had safeguards relating to the privacy of their information.

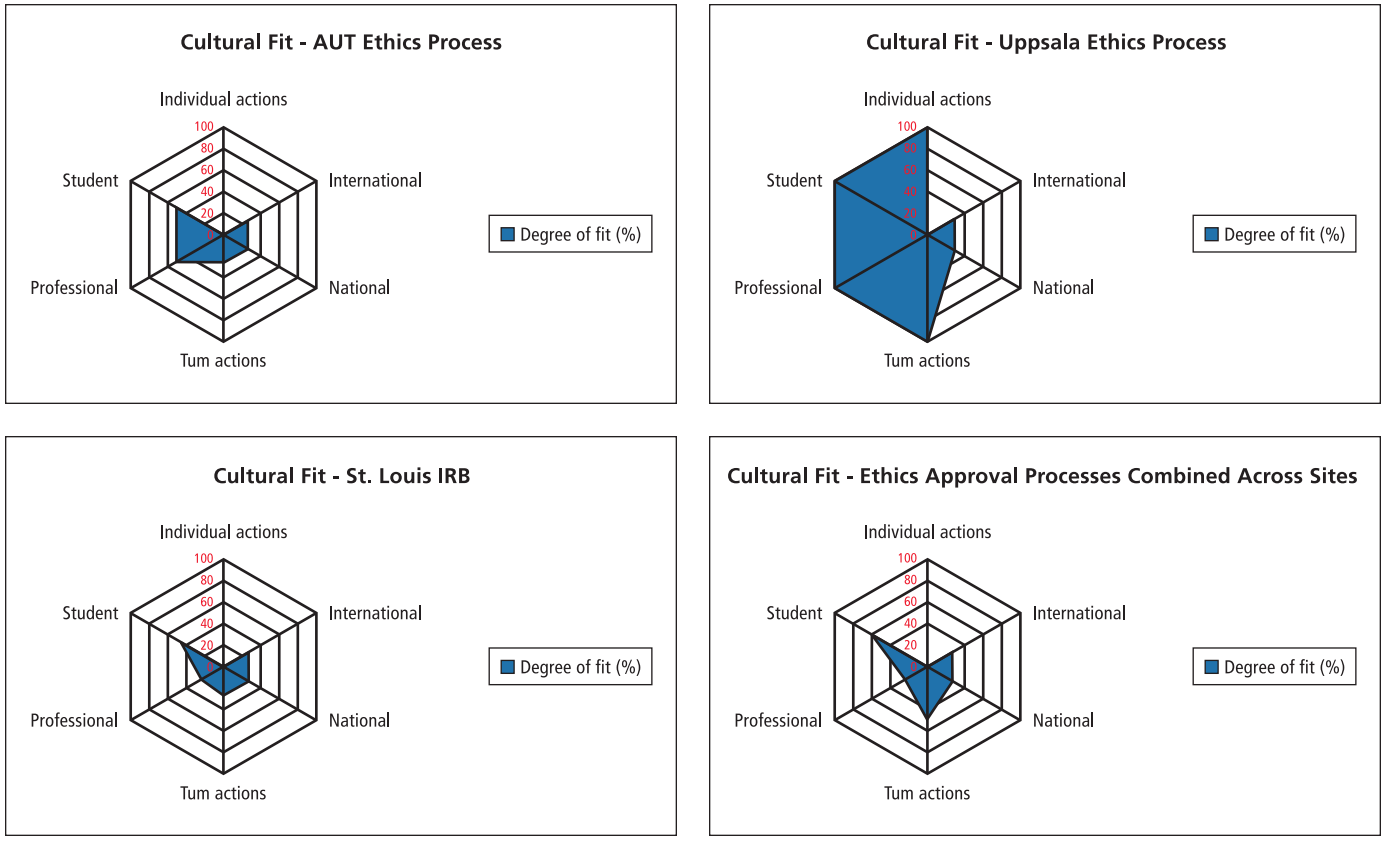

Figure 3: Cultural Dimensions for Metastructure *Research Ethics Approval Process*

The operation of these dimensions at each site are mapped above.

As can be seen from figure 3 above the limited degree of cultural fit was a major inhibitor to the collaboration across sites. This was however but one of many metastructures in operation, although it was definitely experienced as a significant constraint around which we had to work for the collaboration to be effective. It does however demonstrate that there are major barriers to innovative pedagogy with an inbuilt research dimension and which requires collaboration across multiple institutions in differing countries.

3.4 Discussion

The analyses above illustrate approaches to the investigation of technology-use mediation and how to achieve collaborative alignment across distributed contexts. Both examples show cases where the cultural patterns are supportive of collaborative technology use, and cases where they have proved a major inhibitor. For instance, a competitive institutional culture as experienced and reinforced at professional and student level (as with the curved classes in 3.1 above) appears to be an inhibitor to productive collaboration, and thus points to serious challenges for the use of collaborative technologies.

The dimension of culture though at times elusive, is not only pervasive in these analyses, but crucial to the achievement of a degree of fit with collaborative technologies in global settings. The expansion of the model to investigate 'cultural fit' shows promise as a means for systematically unpacking the operation of culture across several layers and demonstrating the extent to which certain cultural patterns support or hinder meaningful collaboration.

4 FUTURE DIRECTIONS

It has to be acknowledged that this work is still in the exploratory stage. We have much to learn about culture and its operation and how to go about analysing it in a productive way. Yet in models of global virtual collaboration such as that we have undertaken in this study the cultural dimensions need to be better understood. We have yet to determine which cultural patterns are most supportive of and which patterns actively militate against productive global collaboration. We see the potential benefits of such exercises in building globally aware citizens and professionals, prepared to take a role in a future which increasingly involves cross-border and cross cultural projects.

One recent extension of this work has been at Uppsala University where I visited in 2008 and worked with students on applying the 'collaborative technology fit' (CTF) model as an aid to their reflection upon the global project in which they were engaged. This proved to have merit in enabling students to consciously reflect upon the cultural aspect of their collaboration. The brief excerpt below from a joint paper with the students illustrates one insight the students gained, through analysis of the institutional metastructure of an 'online global team leaders' meeting'.

"Under the 'cultural' dimension of the CTF model, the Swedish team members noted they may have been culturally

insensitive in their timing of the meeting to suit the Swedish participants. Thus the CTF model was acknowledged as valuable in generating insight for students about the impacts of their own behavior in the global virtual context" [2].

There remains much fieldwork to do to investigate ways of more consistently calibrating the model and refining the scales. Identifying critical metastructures and finding effective ways of focusing on key aspects of a situation and subsequent data analysis will also be important. Determining to what extent these models need to be tailored to different contexts is one potential thread of further research, since these models should have applicability beyond education in commercial settings such as global software teams.

5 CONCLUSION

This paper has outlined a model of 'cultural fit', drawing upon a study of global virtual collaboration conducted in 2004 between three Universities across three countries [5]. This model represents an elaboration of the theory of "Collaborative Technology Fit" developed in the latter study. The models demonstrated show promise in helping us better understand the complex dynamics in operation when we combine people, technology and institutions across borders of space, culture and time. The models outlined here have enabled some insights to be derived about the ways in which culture functions in a layered manner, with differing characteristics at each site. Moreover they have demonstrated the use of tools for diagnosing the interplay of these elements, and how they are realised in a situated manner through practices operating in both the local and global settings.

While these techniques need to be applied, tested and refined more actively in field settings, initial field work [2, 6] has proven promising. **Ir**

ACKNOWLEDGMENTS

Thanks are due to our collaborative colleagues at Uppsala University and St Louis University, and to the students from the three universities who have participated in the continuing programme of global virtual collaborations.

REFERENCES

[1] Barley, S. Technology as an Occasion for Structuring: Evidence from Observation of CT Scanners and the Social Order of Radiology Departments. *Administrative Science Quarterly, 31* 1986, 71-108

[2] Cajander, Å., Clear, T., Daniels, M., Edlund, J., Hamrin, P., Laxer, C. and Persson, M., Students analyzing their collaboration in an International Open Ended Group Project. in *39th ASEE/IEEE Frontiers in Education Conference.*, (San Antonio, Texas 2009), IEEE, T1A1-T1A6.

[3] Clear, T. and Kassabova, D. A Course in Collaborative Computing: Collaborative Learning and Research with a Global Perspective. in Guzdial, M. and Fitzgerald, S. eds. *Proceedings of the 39th ACM Technical Symposium on Computer Science Education*, ACM, Portland, Oregon, 2008, 63-67.

[4] Clear, T. Global Collaboration in Course Delivery: Are We There Yet? *SIGCSE Bulletin, 40* (2) 2008, 11-12.

[5] Clear, T. Supporting the Work of Global Virtual Teams: The Role of Technology-Use Mediation *Computing and Mathematical Sciences* Auckland University of Technology, Auckland, 2008, 1-473.

[6] Clear, T., Dimensions of Collaboration in Global Software Engineering Teams: Explorations of 'Collaborative Technology Fit'. in *Fourth IEEE International Conference on Global Software Engineering (IGCSE'09)*, (Limerick, Ireland, 2009), IEEE, 297-298.

[7] DeSanctis, G. and Poole, M. Capturing the Complexity in Advanced Technology Use: Adaptive Structuration Theory. *Organization Science, 5* (2) 1994, 121 - 147.

[8] Glaser, B. and Strauss, A. *The Discovery of Grounded Theory.* Sociology Press, Mill Valley, CA, 1967

[9] Guzdial, M., Ludovice, P., Realff, M., Morley, T. and Carroll, K., When Collaboration Doesn't Work in *International Conference of the Learning Sciences*, (Seattle, Washington, 2002), Lawrence Erhlbaum Associates, Mahwah, NJ, 125-130.

[10] Hyde, P. Science Friction: Cervical Cancer and the Contesting of Medical Beliefs. *Sociology of Health and Illness, 22* (2) 2000, 217-234.

[11] Leidner, D., Alavi, M. and Kayworth, T. The Role of Culture in Knowledge Management: A Case Study of Two Global Firms. *International Journal of E-Collaboration, 2* (1) 2006, 17-40.

[12] Leung, K., Bhagat, R., Buchan, N., Erez, M. and Gibson, C. Culture and international business: recent advances and their implications for future research. *Journal of International Business Studies, 36* 2005, 357-378.

[13] Myers, M. and Tan, F. Beyond Models of National Culture in Information Systems Research. *Journal of Global Information Management, 10* (1) 2002, 24-32.

[14] Orlikowski, W. and Iacono, C. Research Commentary: Desperately seeking the "IT" in IT Research - a Call to Theorizing the IT Artifact. *Information Systems Research, 12* (2) 2001, 121-134.

[15] Orlikowski, W. Using Technology and Constituting Structures: A Practice Lens for Studying Technology in Organizations. *Organization Science, 11* (4) 2000, 404 - 428.

[16] Orlikowski, W., Yates, J., Okamura, K. and Fujimoto, M. Shaping Electronic Communication: The Metastructuring of Technology in the Context of Use. *Organization Science, 6* (4) 1995, 423 - 444.

[17] Pozzebon, M. and Pinsonneault, A. Challenges in Conducting Empirical Work Using Structuration Theory: Learning from IT Research. *Organization Studies, 26* (9) 2005, 1353–1376

[18] Weisinger, J. and Trauth, E. Situating Culture in the Global Information Sector. *Information Technology and People, 15* (4) 2002, 306-320.

[19] Zigurs, I. and Buckland, B. A Theory of Task-Technology Fit Theory and Group Support Systems Effectiveness. *MIS Quarterly, 22* (3) 1998, 313-334.

TONY CLEAR
School of Computing & Mathematical Sciences
AUT University
Private Bag 92006
Auckland 1142, New Zealand
tony.clear@aut.ac.nz

Categories and Subject Descriptors: K.3.2 [Computers and education]: Computer and Information Science Education – Computer science education, information systems education.
General Terms: Human Factors, Management, Design, Measurement
Keywords: Global virtual teams, collaborative computing, cultural fit, collaborative learning, CS education research, IS education research, technology-use mediation

DOI: 10.1145/1835428.1835444