

FORESIGHT IN ORGANIZATIONAL RELATIONSHIPS

Elisabeth Davenport, School of Computing, Napier University

ABSTRACT

Opal is an EC funded project (IST-2000-28295) designed to establish if and how a computer application may support team building and partnership. The project focuses on the early stages of interaction where rapid and robust assessments must be made of potential partners' competence, compatibility and confidence in each others' future performance. One of the aims of the project is to assess whether it is possible to evaluate potential partners online on the basis of both hard and soft skills. It will do this by providing profiles of a range of partner attributes, including those contributing to feelings of compatibility and trust. This paper considers the design and research processes that underlie the construction of a probe to explore trust and foresight in organizational relationships.

INTRODUCTION

Foresight in organizations is often achieved by means of scenario work. Scenarios allow managers to identify and explore a range of futures that present more or less uncertain conditions (Van der Heijden, 1996; De Geus, 1997). In scenario work, worldviews and planning paths are articulated in narratives based on observations and beliefs about:

- the meaning of macro level trends
- the significance of cues, signs and signals in the external environment or milieu
- the likely response to these by the internal environment or milieu
- organizational prospects in the case of arbitrary events.

By examining organizational capability in the face of such about 'emergences' and 'emergencies', planners can assess what action is required given a range of resources and responses. At this stage, elements are extracted from sets of conventionally hypothesized circumstances that may inform more formal or structured models for allocating resources. In assessing these, hindsight may well play a part – as archives of historical precedents are brought into play; through war stories or by means of more structured analysis and pattern matching. Hindsight may be ambivalent: a set of cues and traits may be mistakenly read as indicative of one type of situation when it is indicative of something else, hitherto unexperienced and unique. It is thus wise to triangulate interpretations of cues. This may be done by means of insight derived from assessments of the current activity and interaction of the actors involved in the scenario. Foresight emerges from an interplay of hindsight and insight that results in a set of reasonable assumptions about future performance.¹

The text that follows presents a case study of an EC funded project (Opal) to establish whether and how a computer application may support team building and partnership.

¹ A comparable account of the intersection of insight and hindsight is offered in Good (1995).

Opal (IST-2000-28295) offers an opportunity to explore links between social computing and social capital. The objective is to build and evaluate a computer application that stimulates the formation of ‘qualified’ online partnerships by allowing new candidates to acquire an extensive understanding of a range of potential partners before a contract is signed in situations where time is short and physical interaction is limited. The project focuses on the early stages of interaction where rapid and robust assessments must be made of partners’ competence, compatibility and confidence in each others’ future performance. (Each of these is the basis of a system component: the ‘competence layer’ (Layer 1); the ‘compatibility layer’ (Layer 2) and the confidence layer (Layer 3). Evaluation of potential partners in each of these ‘layers’ has informed the system architecture. The proposed application must support ‘best matching’ searches in order to perform at least as well as existing ‘matching’ technologies. It may also support reflective practice by broadening the field of view, and the decision parameters for informed choice. It does this by providing profiles of a range of partner attributes in each of the three layers that are extracted from a number of sources: questionnaires, interaction patterns and conversation threads, ‘awareness’ logs. The sources reflect real-world experience, and the resulting profiles combine insight derived from current attributes with hindsight derived from track record data. (Figure 1) One of the team’s research aims is to explore how ‘insight’ and ‘hindsight’ intersect, by asking users of the system to reflect on the specific attributes are in play when partners are selected.

Opal layer	Opal ‘insight’ data	Opal ‘hindsight’ data
Competence	Current skills	Certification Awards
Compatibility	Shared practices Shared techniques/tools Shared professional protocols Standards compliance	Reputation Network collaboration Mutual collaborators
Confidence	‘They do what they say’ Responsiveness Initiative Commitment Consistency	Track record/history Endorsements Recommendations

Figure 1: Opal application layers, ‘insight’ and ‘hindsight’

RESEARCH AND DESIGN RATIONALE

Three commercial companies are involved, whose experiences underpin the scenario work of the design team. Within the domain of HCI, scenario-based design conventionally focuses on usability, and the attributes and affordance of artifacts (Carroll, 1995). In Opal, as partnership as well as usability is involved, scenarios carry an added burden: they have to ‘yield’ or ‘deliver’ insights that are pertinent to judgments about behavior that involve soft insights about tacit knowledge: trust, rapport, social capital, and social networks. The application provides an opportunity to explore a number of ‘second generation’ knowledge management issues (Huysman and de Wit, 2002) that are

manifest at local level in social interactions ². The approach taken in Opal is based on a number of assumptions: that stories and scenarios may be analyzed to produce representations of organizational activity, for example, and that typical scenarios and narratives and genres are indicative of recognizable social order, in the case of Opal, social order at the level of micro-level, local, ‘mundane’ work. (Dourish, 2001; Davenport, 2002)

Scenario work ‘audits’ current perceptions and beliefs about the firm; it has been traditionally applied at a high level in the firm. This paper is concerned with foresight as a micro level of organization, specifically with team formation and partnering activity. At this level also, scenario work may be used to provide insight into potential processes and resources, and the ‘climate’ (tasks, social capital, and emotional capital) that is conducive to workable arrangements. The text that follows presents a case study where scenarios drive design and evaluation of the likely performance of future partners in collaborative ventures among small and medium size enterprises (SMEs). Just as scenario work at the level of strategic planning provides a broad field of view for decision-making, scenario-based design allows managers and engineers/architects to plan for a range of contingencies, and to make parametric judgments about performance. In the case study, judgments about potential partners on the basis of interaction in pertinent scenarios can allow a range of candidate attributes to be identified, and tradeoff calculations made about the pros and cons of collaboration. Scenarios can be used to derive a ‘field’ or ‘zone’ of acceptable behaviours (a pertinent design is offered by Spence and his colleagues (Spence, 2001), the ‘attribute planner’), or, as is argued below, a ‘field’ of acceptable candidates who may be ranked according to the priorities of those managing a project. The Opal team wants to find out if, and how, ‘hindsight’ and ‘insight’ interact in this micro-level local selection process. (Figure 2).

Typical questions for online partnership	Guidance from direct experience (‘insight’)	Guidance from indirect/proxy experience (‘hindsight’)
‘Do these people know what they are doing?’	Assess their understanding of goals and tools on a trial task	Rely on reputation or recommendation
‘Do they deliver on time?’	Set a deadline in a mini-simulation and see how they perform	Ask previous collaborators about the track record
‘Are they responsive?’	Monitor their interaction/conversation patterns in a simulation planning exercise	Rely on reputation/recommendation
‘What is their style of working?’	Assess their availability and initiation/response patterns over a fixed period	Rely on reports of previous collaborators

Figure 2. Performance-related judgments about potential partner behaviour

² Recent work on ‘forgotten’ categories of knowledge such as ‘phronesis’ and ‘metis’ (Tsoukas et al., 1997; Baumard, 1999) is highly pertinent to the case described here.

Scenario-based design, then, can be used to probe foresight in organizational relationships. It takes a number of user stories, and re-presents them as a series of increasingly formal version of the goals, objects, actions and constraints that characterize the story. In this way, the functionality of a proposed design can be anticipated in specifications whose validity is derived from the observations of users in vivo, and whose reliability is established by means of the identification of abstract or typical stories as the design (or abstraction) process unfolds. The Opal project has not involved extensive ethnographic work or workplace observation. It has used the narratives of experienced practitioners (key informants from Opal's commercial partners) to identify relevant narratives of partnership. These have been gathered in written accounts, and elaborated in brainstorming meetings where 'abstract scenarios' have been constructed. Adapting a method derived by Benyon et al. (2000), the output from the concrete scenarios that have emerged from user scenarios has been presented in the form of interaction patterns that capture regularities of usage and activity. The concept was first applied in architectural design by Alexander in the 1970s, who provided templates for activities in a repertoire of community spaces, and proposed that a 'pattern language' might improve the design of habitats by taking account of generic human activities. The concept was adopted by software engineers in the 1980s. It has recently been promoted by Erickson (2000) as a 'lingua franca' for interaction design, and been used as a way of organizing the analysis of ethnographic case studies (Martin et al., 2001). A number of structured formats have been proposed (e.g. Martin et al., 2001; Falconer 1999) that capture critical dimensions (such as context, problem, constraints, solutions) of recurring workplace activities.

Initial work on user scenarios with one of the commercial companies who are partners in the Opal project has provided data on the role of 'insight' and 'hindsight' in existing practice. The competence layer of the Opal platform will focus on 'hindsight', the substance of traditional of job applications, where candidates lodge details of 'qualifications' and 'credentials', details of endorsements (evidence of high status in a professional network for example), referrals to third parties (indirect social capital) and so on. Suggestions for features of the platform include recommender systems and social maps that might reveal overlap across networks and thus be indicative of compatibility. (See, for example, Nardi et al., 2002, and the section below on 'visualization and foresight'). The compatibility and confidence layers will focus on 'insight'. To design for these, the team have drawn on earlier experience of modeling trust (Davenport et al., 1999; Davenport, 2000) with colleagues whose interests span 'social' computer agents, and venture capital interactions. This work suggests that insight into affective or 'soft' factors in interactions can be systematized, when observation is focused on structured interaction. 'Structure' may be imposed by means of experimental design, or may be implicit in routine or norm-based activity. These are combined in the Opal project, where users of the application will be asked to engage in semi-structured interactions that are based on narratives of the implicit order of the workplace.

THE DESIGN CHALLENGES

As the text above indicates, one of the project's design objectives is to provide a robust partnering mechanism that provides reliable and valid insight into the effectiveness of

subsequent collaboration. In traditional face to face recruitment and team formation, both hirers and recruits interact in a number of conventional or generic social settings (interview, aptitude test, eating together, game of golf): these may be seen as high level structured or rule-based exercises that provide cues about each other's likely behaviour in subsequent situations. The design team have defined the 'formation of partnerships' in terms of the process or sequence of events and interactions from the first 'stimulus to hire' (a call for tenders, for example) to the signing of a contract, or formal starting point of a process. In initial work on user stories/interaction patterns, the team (designers and users) were thus able to separate two strands in accounts of user experience of partnerships: stories of the initial phase, and more reflective accounts of the subsequent collaboration, where narrators looked back on the early and later stages of a partnerships, and commented on points where the process of formation was vulnerable, or demonstrated lack of foresight. They could thus identify areas where their judgment was impaired, and ways in which judgment might be better supported. The practitioners involved in initial design work welcomed the idea of a system that does not derive an optimal outcome (the perfect partner), but identifies a range of possible partners whose activities are more or less predictable.

Over a period of three weeks in April 2002, the team worked on a number of initial scenarios that reflect the working contexts of the clients involved: broking (as project managers and as incubator venture capitalists), recruitment (as software developers), and impresarios, putting design teams together in collaborative projects. A number of 'generic' structured narratives relating to tendering were captured: 'de novo'; 'forced marriage'; 'client to broker'; 'broker/recruiter'. This paper focuses on scenarios involving the 'local' commercial partner in the project, a medium sized database specialist in Central Scotland.

PROBLEM SCENARIO ONE

Figure 3 presents a story that describes a project that had been undertaken five years earlier. With hindsight, the narrator could identify several 'cues' that were missed, that would be more salient in interactions mediated by an application like Opal).

User story: Constructing a team
Part 1 Company A notices a call for tender in OJEC to submit a bid for public sector database work. As one of around 40 or 50 agencies in this niche market, he feels that his company is competent to submit, but that they will need to supplement their skills base. As the niche market works on the basis of a professional network, he knows which company he will approach – one that has complementary skills and that has a good reputation and has been recommended by a third party whom Denny has worked with.
Part 2. Contact is made with Company B who agree that they should both explore the tender and request a full version of the call.
Part 3. A and B both read the full version and agree that they can do this but that they might need to contact a third company to fill a remaining gap in the skills required.
Part 4. A meeting in Sheffield is arranged to agree on the division of labour, and identify the specific skills that are absent. They can identify two candidates from their knowledge of the network.

Part 5. These are approached by phone – the preferred candidate agrees to a meeting.
Part 6. B goes to the meeting on the company's premises. The company reveals that it wishes to submit its own bid. They themselves are not willing to subordinate themselves to a small company, as they consider themselves a 'big' player. B rejects the offer.
Part 7. The second candidate is approached by phone, and agrees to participate. A meeting is arranged.
Part 8. All three meet face to face. The meeting is very task oriented. There are a number of identifiable phases: <ol style="list-style-type: none"> 1. Exploratory discussion – all very polite and showing respect for each other's reputation 2. They consider the invitation to tender in detail, 'forming thoughts on the main elements', and work out a division of labour for writing the bid document. 3. The issue of the 'lead' is discussed. All three are interested, but a pragmatic decision is made that Company B should lead as it can meet the financial back-ups and guarantees required by the tender. 4. This raises the issue of cultural clash as Company B comes from a bureaucratic tradition (spin-off from local government) and A and C are entrepreneurial.
Part 9. A bid is submitted. The bid is successful and a contract is signed.

Figure 3: Structured user story of a response to tender invitation.

This scenario revealed a sequence of activities that combined generic actions (calls for tender, meetings, preparation of bids and associated documentation and media) using a range of existing technologies (phone, fax, web access). Patterns of affect can be identified, as confidence and compatibility are tested in the early stages of collaboration. When time is short (the case of most of the contracts that constitute the business of small and medium contractors), the social network (which offers some level of reliability by proxy) is used as a source of contact. In the first story to emerge in the workshop, this took the form of an initial approach to Company B by Company A on the basis of third party recommendations. In a subsequent face to face meeting between A and B there was a 'sense of strong rapport', as each presented ideas on how to proceed, - this perceived agreement led A to entrust B with negotiations that brought a third party, C (identified through B's network) into the group.³ The agreement of all partners to proceed with a rapid bid was hammered out in an all day meeting of the three company directors, where the 'feel good' factor was strong. This proved, with hindsight, to be an imperfect indicator, as comparable rapport was not established among the subordinate colleagues who subsequently has to work together on the project, a phenomenon that has been observed in many other partnerships.

In the design group's discussion of this scenario, a number of issues related to foresight emerged. Firstly, a better partnership might have emerged if a wider range of partners had

³ Prior to the entry of Company C, an abortive approach to company X led to rejection, as X, a larger form, wished to be principle in its own bid, and did not want to work with 'small fry', making an implicit assumption that the culture and competence of A and B would not be appropriate.

been available as the basis on which to choose. Given the short time frame, A had to rely for confirmation of B's competence on the social network that defines his niche community. A database with appropriate 'hindsight' attributes for a number of candidates – experience, endorsement, and so on would have resulted in a more informed choice. Secondly, as the text above indicates, small companies such as A depend on multiple submissions of contracts; this pressure may lead to hasty judgments, or 'premature' trust. In the case of A, B and C, subsequent interaction with B revealed clashes in organizational culture which were not critical to the survival of the project but did impact on the 'climate' of the team. Some means of sampling each other, by discussing project tasks and plans, and thus experiencing each other's approach over a wide range of issues ('insight' data) would have been useful. This might have flagged the mismatch of styles at lower levels of organization that undermined the rapport established by those involved in the initial contract negotiation. After the event, Company A saw that the 'rapport' experienced in meetings was based on mutual assumptions/expectations, when a mutually agreed *modus operandi* might be a more appropriate indicator of compatibility.

The issue for many of the SMEs who are the likely market for Opal is not to be forced into accept/reject prematurely as is currently the case, but to have computer support for a more informed selection from a number of candidates who are placed within a 'tolerance' zone. Position (their own and that of others) in the zone will allow partners to understand more fully the implications of subsequent collaboration, to alert themselves to sensitive spots or 'holes on the road', and prepare appropriately.

PROBLEM SCENARIO TWO

Story two presents a different set of challenges. In this follow-on from Story one, A and B agree to work together on a second bid, as they have successfully completed the project involved in Story one. In spite of cultural dissonance, they seek a third party again through the professional network that defines their market niche. As the crucial meeting to write the bid, there is serious disagreement on the approach and A and C perceive that B is making a bid for sectoral status, rather than addressing the specifications of the tender. In spite of this they forge ahead as a month of company time (that most precious commodity) has already been invested: The bid is unsuccessful. What might have been useful, A observed, was a system to support micro-level foresight early in the process, before the time investment made it difficult to pull out; more useful still, would be a system to support multiple concurrent micro-level assessments, to allow selection a broader range of candidates.

PROBLEM SCENARIO THREE

In Story three, A is approached by an agency to act as a project manager. A are happy to work with this agency (a major source of contracts) and confident that they can not only manage the project, but undertake man of the tasks, The agency, however, demands that they project manage only, and introduce them to firm D, who will be the subcontractor. Firm D's culture is not compatible with Firm A, and the project proves to be unworkable: Firm A end up 'picking up the pieces' and doing the work themselves. What would have been useful here is a system to support rapid scanning of alternative partners (and thus

provide sufficient ‘insight’ and ‘hindsight’ data), to counter-bid within the extremely tight timeframe imposed by the agency.

EMPIRICAL WORK ON TRUST AS A SOURCE OF ATTRIBUTES FOR FORESIGHT

In each of these scenarios, time was short and prior information about partners was inadequate, either because of lack of prior acquaintance, or because previous experience in one situation was not a reliable guide to performance in a different situation. What system features might improve evaluation in the early stages of a project by providing ‘insight’ and ‘hindsight’ data to support reasonable assumptions about subsequent performance? In addressing this question, the Opal design team has drawn on a large corpus of work on interpersonal trust, specifically situated trust in business contexts. Not all of this is pertinent to the Opal project. Kramer (1996) suggests that the treatment of trust by cognitive psychologists has “over-relied on simple mixed-motive games”. What is required is a social computing approach, or, as he puts it, an exploration of “how trust-related cognitions are influenced by the specific organisational context within which such cognitions are inevitably embedded” (Kramer, 1996, p. 238). This approach draws a distinction between trust cues provided by the individual and trust cues provided by the situation/context, as such cues play at least as an important role as psychological traits. In a detailed exposition of situational trust for the purposes of designing trustworthy computer agents, Marsh (1994), and, more recently, Zolin et al., (2002) state that the lack of definition has led to confusion. Dibben (2000) provides a comprehensive evaluation of the literature on trust and categorises the concept into three classifications: dispositional trust, learnt trust, and situational trust. For this project situational trust is most pertinent, as it focuses on the situation that actors are in, and the “amount and quality of communication” (Dibben, 2000, p.7). Dibben further notes that “although one may trust an individual on the whole, one may not do so in certain situations and under certain circumstances” (Dibben, 2000, p. 7).

A number of analytic and empirical studies (many undertaken with student samples) have demonstrated that trust can be effectively de-componentialised, and thus engineered.⁴ This process can, as the reference above to Dibben’s work indicates, focus interactors’ attention on how trust works in a given situation. A comprehensive and informative analysis of ‘trust formation in new organizational relationships’ is offered by McKnight et al. (1995). This report covers definitions of trust, the formation process, and the role of emotion in trust. Trust, say the authors, is based on four beliefs about others: their benevolence, their honesty, their competence and their predictability. The trust formation process early in the relationship is indicative of trust later in a relationship (p. 19), and

⁴ A number of analyses of trust in contexts that are relevant to the Opal project are presented by Castelfranchi and Tan (2001) in a recent edited volume. Falcone and Castelfranchi (2001) in this volume discuss ‘social trust’ in terms of a continuum; Rea (2001) considers how trust may be engendered in electronic environments; and Weigand et al. (2001) discuss trust in terms of Speech Acts and Workflow modeling (an approach that has some affinities with Weisband’s ‘initiations-responses’ analysis). A pertinent series of studies at the Electrical Engineering Department at Imperial College of Science, Medicine and Technology, London, can be accessed at <http://alfebiite.ee.ic.ac.uk/Templates/papers.htm>.

five factors will affect the early formation of trust: dispositional trust, situational trust, the categorization mechanisms of interactors, illusory trust and system trust. Dispositional trust is salient only in situations that are highly ambiguous, novel or unstructured and that offer few cues about what is going on. It is invoked if no more specific information is available.

As Opal is targeted at a business environment, where schemas and genres to some extent drive judgments about who and what is appropriate, and dispositional trust may be disregarded as a key component in design rationale. ‘System’ trust⁵ is not a salient issue either, as all those involved in the business partnering process can be assumed to trust the commercial systems within which they operate. From the perspective of the Opal project, trust is relative to the specific business situations that engage different partners. ‘Swift trust’ is of particular relevance to the Opal project. The term was first used by Meyerson, Weick and Kramer (1996) “to account for the emergence of trust relations in situations where the individuals have a limited history of working together” (Harrison, Dibben and Mason, 1997, p. 65). Swift trust has been explored in the context of virtual teams (the case of Opal) by Jarvenpaa and Leidner (1998) who suggest that, in practice, a clear definition of roles and responsibilities, clarity in order to avoid confusion and disincentive, effective handling of conflict, and “thoughtful exchange of messages at the beginning of the team’s existence” (Jarvenpaa and Leidner, 1998) will provide the basis for a successful virtual team. Certain behaviours on the part of the virtual team members distinguish virtual teams with high trust from virtual teams with low trust. For example those teams in the ‘low initial /low subsequent trust’ category lacked social introduction, and had a general lack of enthusiasm. Those teams in the high/high category experienced the inverse of this, with extensive social introduction and continued enthusiasm.⁶

SYNTHETIC INTERACTION AND FORESIGHT

Recent empirical work on trust-based interactions among both human and computer agents may guide the Opal team in selecting interactions for Layers 2 and 3 of the application that are conducive to insight. Experimental work described by Iacono and Weisband (1997) is highly pertinent to our design rationale. This describes a project with distributed electronic teams, who must ‘quickly develop and maintain trust relationships with people that they hardly know, and may never meet again, with the goal of producing interdependent work’. The time frame for the projects was 24 days. In this situation, say the authors, trust is less about relating than doing, as swift trust is ‘less an interpersonal form than a cognitive and action form’. (p. 1). Temporary systems require quick mutual adjustments so that people can innovate as required; in online work, technology must support this process. Good communication habits and the ability to multi-task and handle remote requests while attending to local demands are key practices: the ‘compatibility layer’ of Opal can focus on these areas.

⁵ System trust, according to Baier (1986) refers to the roles, responsibilities, promises and contracts that are endorsed by interacting parties in a partnership.

⁶ In the past decade, a number of research studies have explored the validity and reliability of first impressions, specifically in the context of trust at levels of ‘zero acquaintance’ (Albright et al., 1988). It is clear that ‘first impression’ data may contribute to trust assessments, if only on the dimension of ‘conscientiousness’. (Borkenau and Liebler, 1992; 1993).

Active participation may be seen, say the authors, as a system of initiations and responses. Initiations involve trust, because they ‘make one’s preferences public’ (which may incur risk); each initiation strengthens participants’ perceptions that trust is reasonable, and incurs more initiations. The making of responses ‘signals and inspires trust’ in the group. (p. 2). Action moves forward in a cycle of initiations and responses. We suggest that this activity is appropriate to interactions in the ‘confidence layer’ of Opal, as turn-taking is a fundamental or ‘primitive’ guide to social engagement: Drew, (1995) suggests that the ‘anticipatory interactive planning’ (AIP) that is supported in initiation-response sequences is a defining characteristic of social intelligence. In the fieldwork described by Iacono and Weisband, initiations were categorized as ‘getting together’; ‘work-process’; ‘work-content’; ‘work-technical’; ‘needing-contact’; ‘fun-talk’. Work-process and work-content initiations correlated with high performance, as did number of total initiations, and the pattern of timing. Within the project period, team members formed enough social information about each other to reinforce initial trust levels. Age correlated with high performance, and the authors suggest that age may be linked to multi-tasking. They suggest that working on a temporary distributed team is different from other on-line social experiences such as posting to Newsgroups and conversing in chat rooms, a finding that has implications for Opal.

Weisband (n.d.) has summarized the findings of a subsequent study (involving fifteen teams in two universities) : low performing teams rely on their perceptions of others as a predictor of good performance; high performing teams rely on what people do and say as a predictor of good performance. ...teams who may not engage in the hard work of doing distant collaboration may feel good about the process and each other, but such perceptions do not lead to successful outcomes. Activity awareness information is important: knowing what actions are done at any given moment, as is availability awareness or knowing whether others can meet or take part in an activity. Process awareness allows people to see where they fit at any give time and how the project is moving along, and perspective awareness gives information (about beliefs and values for example) that is helpful for making sense of actions. We suggest that micro-level ‘Shared Situational Awareness’ borrowing a term from macro-level studies of teambuilding in the US defense forces (Loughran, 2000) based on Weisband’s work might usefully be built into Layer 2 (‘compatibility’), as actual monitoring of progress contributes more to high performance than feelings about others. In an analogous study of ‘antecedents’ to trust (1998b) exploring perceptions of others’ ability, integrity and benevolence, Jarvenpaa and Leidner indicate that perceptions of others’ integrity were important to initial trust, and that perceptions of benevolence were least important.

Each of the three layers of the proposed application must deliver ‘attributes’ that are assembled into profiles. The exercises (or ‘games’ as they are called in the Opal proposal) that are used for experiential interaction must thus be amenable to formal analysis and representation. As the text above indicates, Iacono and Weisband suggest that initial patterns of ‘initiation’ and ‘response’ in an online planning scenario were indicative of successful team performance later in a project, and that these can be captured in a simple visualization. Comparable visualizations are available for ‘moves’

and ‘presence’ in a range of online interaction spaces. Preece (2002) presents the ‘goal’ of these as follows: ‘to allow participants to more easily gauge such things as, who is present, what they are doing, how long they have been there, who the leaders are and how others judge the value of their contributions’ (p. 38). Visual query is a function that Opal is intended to support, and the design team is currently specifying visualisations of type of interactions that may generate ‘insightful’ attribute sets.

Activity and process awareness (two of Weisband’s categories) can be supported by proxy systems of the kind described by Erickson et al. (2002). These researchers define a ‘social proxy’ as a minimalist visualization of people and their activities’ (p. 41), and describe a number of genres of online interaction (auction, call-centre ‘line’) where such proxies can support judgments about how to proceed. Erickson and his colleagues claim that ‘by making social cues visible, and allowing traces to accumulate over time, we create a resource that allows people – especially those familiar with the interactive context – to draw inferences about what is happening which can, in turn, shape their collective activity’. (p. 44) Donath (2002) and Smith (2002) provide examples of comparable work in the specific online contexts of chat rooms and Usenet lists. An indicative typology of awareness types (Weisband, n.d.) and visualisation tools to support awareness is provided in Figure 4.

Opal Layer and awareness type	Visualisation tool
Competence layer	ContactMap (Nardi et al., 2002)
Compatibility layer: Activity awareness Perspective awareness	Babble (Erickson et al., 2002) Loom (Donath, 2002) People Garden (Donath, 2002) Threadtracker (Smith, 2002) Coterie (Donath, 2002)
Confidence layer: Process awareness Availability awareness	Timeline (Erickson et al., 2002) Babble (Erickson et al., 2002)

Figure 4. Opal layers, awareness types and visualisation tools for ‘insight’, ‘hindsight’ and partnerships.

In addition to supporting awareness in online interactions, the Opal team proposes to exploit such visualisations in an archive of interaction profiles that may serve as a ‘social capital proxy’, or ‘hindsight’ data bank. This raises obvious issues of privacy.

CONCLUSIONS

The paper has discussed the design and research objectives that underlie the construction of a probe to explore foresight in organizational relationships. The design process (scenario-based) may be seen as an exploration of theory, as it is premised on a view of organizational learning that is experiential (the ‘hindsight’ issues addressed in the paper) and phenomenological (the ‘insight’ issues). The approach has been synthesized from earlier empirical studies of micro-level routine work, and organizational trust. By

focusing on the specification of attributes that characterize different ‘levels’ or ‘layers’ of partnership, the probe provides a means to assess how insight and hindsight contribute to foresight. The first prototype of the system is under construction and will be assessed early in 2003.

ACKNOWLEDGMENTS

I wish to acknowledge the work of my Opal team colleagues, David Benyon, Martin Graham and Jessie Kennedy, and the work of research assistants, Guy van de Walle and Leo McLaughlin.

This paper was presented by Elisabeth Davenport at the Conference on “Developing Organisational Foresight in the Knowledge Economy” at Strathclyde University, Glasgow, Scotland, July 2002.

REFERENCES

- Albright, L. et al. (1988). Consensus in personality judgment at zero acquaintance. *Journal of Personality and Social Psychology*. 55, 387-395.
- Alexander, C., Ishikawa, S., Silverstein, M., Jacobson, M., Fiksdahl-King, I. And Angel, S. (1977) *A pattern language: towns, buildings, construction*. Oxford: Oxford University Press.
- Baier, A. (1986) Trust and antitrust. *Ethics*, 96, 231-260.
- Baumard, P. (1999) *Tacit knowledge in organizations*. London: Sage.
- Benyon, D. and Imaz, M. (1999) Metaphors and models: conceptual foundations of representations in interactive systems development. *Human-computer Interaction*, 19, 159-189.
- Borkenau, P. and Liebler, A. (1992) Trait inferences: sources of validity at zero acquaintance. *Journal of Personality and Social Psychology*, 62 (4) 645-657.
- Borkenau, P. and Liebler, A. (1993) Convergence of stranger ratings of personality and intelligence with self-ratings, partner-ratings, and measured intelligence. *Journal of Personality and Social Psychology*, 65 (3), 546-553.
- Carroll, J. (1995) *Scenario based design*. John Wiley.
- Castelfranchi, C. and Tan, Yao-Hua. (2001) *Trust and deception in virtual societies*. Dordrecht: Kluwer Academic Publishers.
- Davenport, E. (2002) Mundane knowledge management and micro-level organizational learning: an ethological approach. *Journal of the American Society for Information Science & Technology* (In press).
- Davenport, E. (2000) Non-contractual trust, design and human and computer interactions. (2000) In G. Szwillus and T. Turner. (Eds.) *CHI 2000 Extended Abstracts* New York; ACM, 239-240.

- Davenport, E., Thimbleby, H., Marsh, S. and Dibben, M. (1999) 'Artificial morality': representations of trust in interactive systems. In S. Brewster, A. Cawsey, and G. Cockton (eds). Human-Computer Interaction INTERACT '99. Swinburne: British Computer Society/International Federation for Information Processing (IFIP), 211-212.
- De Geus, A. . (1988) The living company: growth, learning and longevity n business. London: Nicholas Brealey Publishing.
- Dibben , M.R.. (2000). Exploring Interpersonal Trust in the Entrepreneurial Venture. London: Macmillan.
- Donath, J. (2002) A semantic approach to vizualizing conversation. Communications of the ACM, 45 (4),45-49.
- Dourish, P. (2001) Seeking a foundation for context-aware computing. Human-computer Interaction, 16, 229-241.
- Drew, P. (1995) Interaction sequences and anticipatory interactive planning. In E. Goody (Ed.,). Social intelligence and interaction. Cambridge: Cambridge University Press, 111-138.
- Erickson, T., Halveson, C., Kellogg, W., Laff, M. and Wolf, T. (2002) Social translucence: designing social infrastructures that make collective activity visible. Communications of the ACM, 45 (4), 40-44.
- Erickson, T. (2000). Supporting interdisciplinary design: toward pattern languages for workplaces. In P. Luff, et al. (Eds.) Workplace studies: recovering work practice and informing system design. Cambridge: Cambridge University Press, 357-368.
- Falconer, J. (1999). The business pattern: a new tool for organizational knowledge capture and reuse. In L. Woods (Ed.), Proceedings of the 62nd ASIS Annual Meeting: Knowledge creation, organization and use (pp. 313-330). Medford NJ: Information Today.
- Falcone, R. and Castelfranchi, C. (2001) Social trust: a cognitive approach. In Castelfranchi, C. and Tan, Yao-Hua. Trust and deception in virtual societies. Dordrecht: Kluwer Academic Publishers, 55 – 90.
- Good, D. (1995) Where does foresight end and hindsight begin? In E. Goody (Ed.,). Social intelligence and interaction. Cambridge: Cambridge University Press,139-149.
- Harrison, R.T., Dibben, M.R. and Mason, C.M. (1997). The Role of Trust in the Informal Investor's Investment Decision: An Exploratory Analysis. Entrepreneurship Theory & Practice. Special Issue: Informal Venture Capital, 20 (2), 63-81.
- Huysman, M. and de Wit, Dirk. (2002) Knowledge sharing in practice. Dordrecht: Kluwer Academic Publishers.
- Iacono, C.S. and Weisband, S. (1997) Developing trust in virtual teams. In Proceedings of HICSS-30, Virtual Communities Minitrack, Hawaii, January 2002. Los Alamitos: IEEE. (CD ROM).

- Jarvenpaa, S.L. and Leidner, D.E. (1998a). Communication and Trust in Global Virtual Teams. *Journal of Computer Mediated Communication*, 3, (4). At <http://www.ascusc.org/jcmc/vol3/issue4/jarvenpaa.html>, June 1998.
- Jarvenpaa, S.L. and Knoll, K., and Leidner, D. (1998b) Is anybody out there? Antecedents of trust in global virtual teams. *Journal of Management Information Systems*, 14 (4), 29 – 64.
- Kramer, M. and Tyler, T. (Eds). (1996) *Trust in organizations: Frontiers of theory and research*. Thousand Oaks, CA: Sage Publications, 166-195.
- Loughran, J. (2000) Working together virtually: the care and feeding of global virtual teams. At www.dodccrp.org/2000ICCRTS/cd/papers/Track4/009.pdf
- McKnight, D. H., Cummings, L. and Chervany, N. L. (1995) Trust formation in new organizational relationships. At misrc.umn.edu/wpaper/WorkingPapers
- Marsh, S. (1992) Trust in Distributed Artificial Intelligence. In Castelfranchi, C. & Werner, E. (Eds.) *Artificial Social Systems, Proceedings 4th European Workshop on Modelling Autonomous Agents in a Multi-Agent World*, Italy, 1992, Springer LNAI 830 (1994).
- Martin, D., Rodden, T., Rouncefield, M., Sommerville, I. and Viller, S. (2001) Finding patterns in the fieldwork. In W. Prinz. Et al. (Eds.) *Proceedings of the Seventh European Conference on Computer Supported Cooperative Work*. 16-20 September 2001, Bonn, Germany. Dordrecht: Kluwer Academic Publishers, 39-59.
- Meyerson, D., Weick, K. E., and Kramer, R. M., (1996). Swift trust and temporary groups. In: R. M. Kramer and T. R. Tyler, eds. *Trust in organizations: Frontiers of theory and research*. Thousand Oaks, CA: Sage Publications, 166-195.
- Nardi, B., Whittaker, S., Isaacs, E., Creech, M., Johnson, J. and Hainsworth, J. (2002) Integrating communication and information through ContactMap. *Communications of the ACM*, 45 (4), 89-95.
- Preece, J. (2002) Supporting community and building social capital. *Communications of the ACM*, 45 (4), 37-39.
- Rea, T. (2001) Engendering trust in electronic environments. In Castelfranchi, C. and Tan, Yao-Hua. *Trust and deception in virtual societies*. Dordrecht: Kluwer Academic Publishers, 221 – 236.
- Smith, M. (2002) Tools for navigating large social cyberspaces. *Communications of the ACM*, 45 (4), 51 – 55.
- Spence, R. (2001) *Information Visualisation*. New York: ACM Press.
- Tsoukas, H. and Cummings, S. (1997) Marginalization and recovery: the emergence of Aristoteilan themes in organization studies. *Organization Studies*, 18 (4), 655-683.
- Van der Heijden, K. (1996) *Scenarios: the art of strategic conversation*. Chichester: John Wiley.

Weigand, H. and van den Heuvel, Willem-Jan. (2001) Trust in electronic commerce. In Castelfranchi, C. and Tan, Yao-Hua. Trust and deception in virtual societies. Dordrecht: Kluwer Academic Publishers, 237-257.

Weisband, S. (no date) Maintaining awareness in distant team collaboration. At <http://misdb.bpa.arizona.edu/~lzhao/brownbag/suzie-abstract.html>. Accessed 4 May 2002.

Weisband, S. (no date) Maintaining awareness in distant team collaboration. Seminar abstract at <http://misdb.bpa.arizona.edu/~lzhao/brownbag/suzie-abstract.html> . Accessed 4 May 2002.

Zolin, Z., Levitt, R., Fruchter, R. and Hinds, P. (2000) Modeling and Monitoring Trust in Virtual A/E/C Teams; A Research Proposal.
<http://www.stanford.edu/group/CIFE/Publications/index.html>