

DESIGN THEORY FOR COLLABORATIVE TECHNOLOGIES: ELECTRONIC DISCOURSE IN GROUP DECISION

James Sheffield

Victoria University of Wellington

j.sheffield@auckland.ac.nz

Abstract

This paper proposes a theory based on pragmatism and multiple discourses for the design of technology-enabled collaboration. The practical value of the theory is explored in the context of an intervention enabled by Group Support Systems (GSS) in regional governance and comprehensive urban planning. Qualitative measures were obtained of the degree of confusion (lack of understanding) and conflict (lack of trust) before and after the meeting, and participant performance and satisfaction with electronic discourse. The focus question is “Do electronic discourses enhance participant’s understanding and trust in scenario planning?”

Keywords: Communicative action; Critical interpretive case study; Facilitated collaboration; Inter-organizational conflict.

1. Introduction

This paper proposes a theory for the design of technology-enabled collaboration based on some ideas about pragmatism (Metcalf, 2008; Omerod, 2006) and systemic intervention (Boyd et al, 2007; Midgley, 2000). The dual focus on concepts and practical experience is in the tradition of inquiring systems (Churchman, 1971), problem structuring methods (Rosenhead and Mingers, 2001), systems thinking (Jackson, 2003; Midgley, 2003), and critical pragmatism (Ulrich, 2007). The purpose is to propose design principles based on concepts of rationality associated with different discourses (Habermas, 1984; Schultze and Leidner, 2002). The design principles directly address issues of governance and power relations, and accept that elements of dissensus – confusion and conflict - are integral to collaboration. The resulting design theory focuses on the purpose served by facilitated collaboration processes in the context of confusion and conflict. The theory complements Information Systems design theories (Markus, Majchrzak and Glasser, 2002; Walls, Widmeyer and El Sawy, 2002), and the engineering of collaboration in organizations (Briggs, Nunamaker and Sprague, 2004), that more directly address the properties of the IT artifact.

The practical value of the theory is explored in the context of an intervention enabled by Group Support Systems (GSS) in regional governance and comprehensive urban planning. The practical problem is as follows. In the urban region of Auckland, New Zealand, decision making is embedded in an historical context. Decision making requires communication on complex issues among a large number of local government organizations. Actions in the Auckland region are governed by elements of national government, the regional council, four cities and three districts (Figure 1). These authorities are collectively responsible for some 64 organizations. The public participates in governance by electing officials, working with one of 31 community boards, and

paying taxes. While the purpose of the system is collaborative, the political, funding, and operational complexities reflect confusion (lack of understanding) and conflict (lack of trust). *Confusion* arises from the limited role of a single decision maker and the complexity of the substantive factual issues. Region-wide or comprehensive urban planning involves a critical evaluation of conflicting claims about intertwined criteria related to transportation, housing, workplaces, amenities, etc, by individuals primarily situated within a single organization. The recursive complexity of inter-twined conceptual and empirical issues makes an analytical solution unlikely. *Conflict* arises from the complexity of the power relationships among decision makers. Local Government legislation confers powers on the regional council to plan for the region ‘in consultation with’ territorial authorities. Each authority maintains a planning office responsible to its own council. Each is empowered to serve its own constituency and expects the comprehensive urban plan to serve its own interest. Regional planning is informed not by a search for an analytical hierarchy but by communication to resolve tensions between emergent competitive and cooperative goals of stakeholders. Collaborative planning occurs from time to time under the auspices of the regional council, the mayoral forum, and the *regional growth forum* (circled in Figure 1). Planning becomes the exercise of technical skills on behalf of constituencies with a history of confusion, conflict, and the exercise of power.

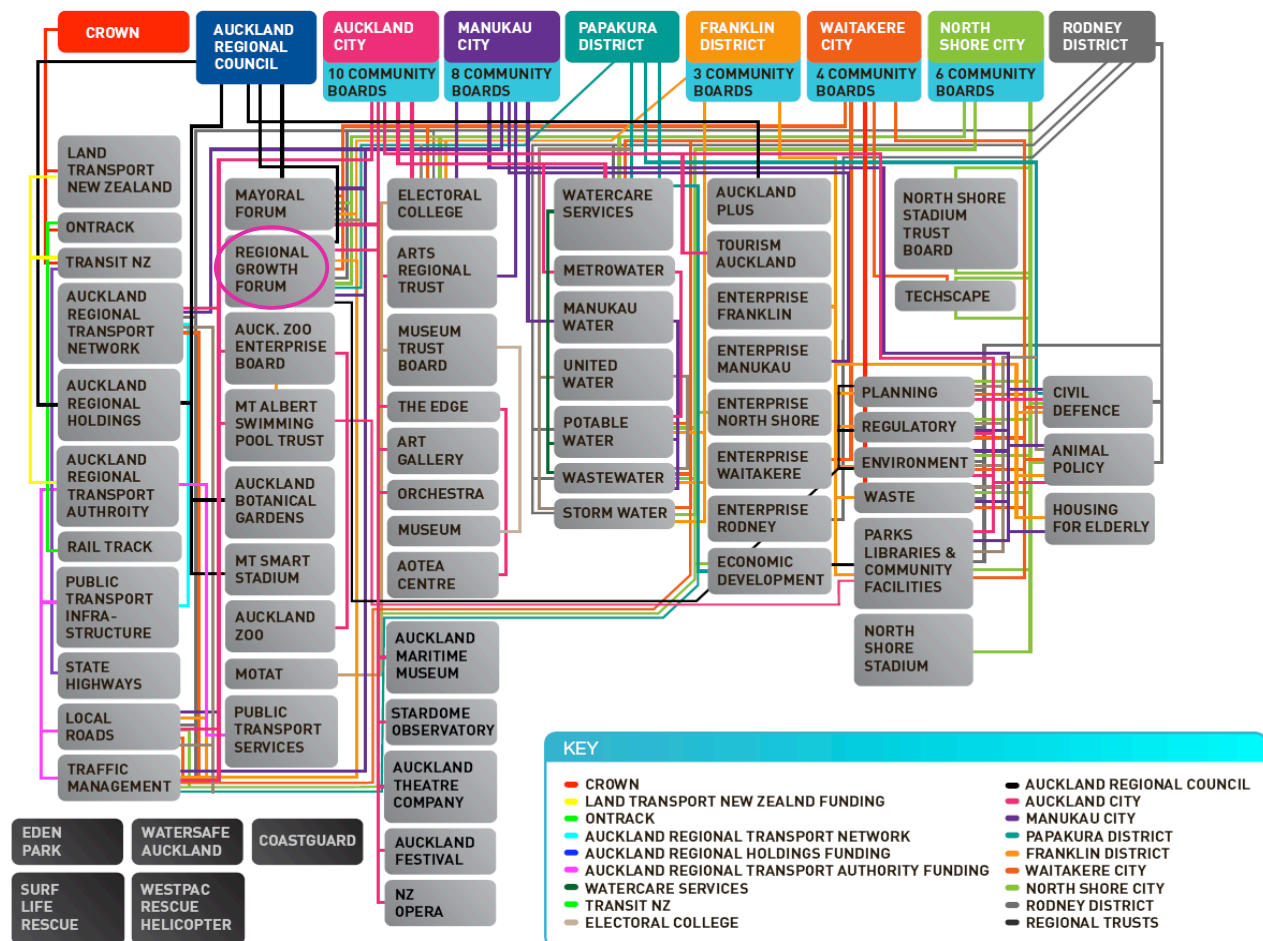


Fig. 1. Governance of the Auckland region

Over the last three or four decades a combination of limited resources and population growth has exacerbated conflict, especially about transportation issues. Trip times are increasing and transportation costs, which include lost productivity, are increasing. While transportation modelling is used extensively, issues of governance, funding, and collaborative planning remain. Organizational roles include control, participation, planning, funding, and operation/management. Each organization manages part of the transport system but none is responsible for the system as a whole. In the absence of a single governance structure, the deliberations in the regional growth forum are likely to remain conflicted (Royal Commission on Auckland Governance website, New Zealand Council for Infrastructure Development, 2008) (Figure 2).

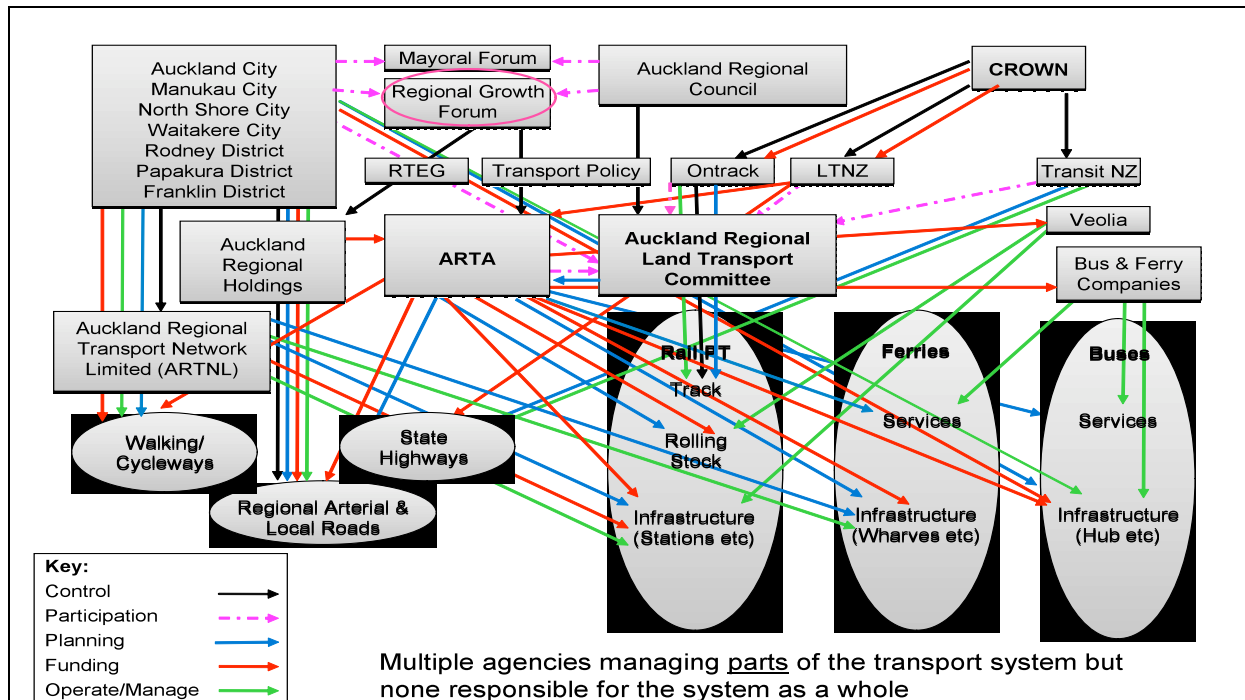


Fig. 2. Transportation governance

1.1. Collaborative technologies

The role of collaborative technologies in planning meetings of the regional growth forum is unclear. Group Support Systems (GSS) technology offers advantages but, in this case, the *design* of decision making processes must directly address challenges to governance, and *inter-organizational conflict*. For example, if GSS technology is employed by the regional growth forum, whose interpretation of the ends served by the electronically-supported meeting should determine success? Who is the client? (Ackermann et al, 2005). What roles and responsibilities will be recognised? (Franco, 2008). Is it sensible to expect powerful stakeholders to use collaborative technologies when these introduce unwanted accountability and make the exercise of power more difficult? (Schultze and Leidner, 2002; Lewis et al, 2007). By what concept(s) of rationality or validity should the facilitator be held accountable for a positive outcome? (Kolschoten, Den Hengst-Bruggeling and De Vreede, 2007). Concepts that guide systemic intervention, and illuminate the complexity of the issues in which *these* decision makers are embedded, must draw on multiple perspectives and research paradigms. Table 1 identifies

characteristics associated with three research paradigms (Guo, Sheffield, 2008). These perspectives are complex and mutually interpenetrating – practical research strategies are defined by their relationships to each. In practice, the validation criteria for positivist research prioritize objective truth; interpretive research prizes both community norms and objective truth; critical research embraces personal sincerity, community norms, and objective truth (Midgley, 1992).

Table 1

Research paradigms

Research Paradigm	Positivist	Interpretivist	Critical pluralist
Perspective of researcher	Stands aloof and apart from stakeholders and subject matter so that decisions can be made objectively	Becomes more fully involved with stakeholders and subject matter to achieve a good understanding of the stakeholders' worlds	Active involvement with stakeholders to surface illusions and to implement alternatives that will improve their worlds
Goodness or quality criteria.	Conventional bench- marks of “rigor”; internal & external validity; reliability.	Trustworthiness and authenticity; Fit with social norms and values.	Historical situatedness; erosion of ignorance and misapprehensions; sincerity of beliefs; action stimulus.
Validity claim	Objective truth of evidence base	Rightness of community norms	Sincerity in expression of personal understanding

While Briggs, Nunamaker and Sprague, 2004; Hevner et al, 2004; Markus, Majchrzak and Glasser, 2002; Walls, Widmeyer and El Sawy, 2002 offer design support and theoretical foundations from a positivist perspective, and Boland, 1978; Lee, 1994; Klein and Myers, 1999; Trauth and Jessup, 2000; Walsham, 1995 offer design support and theoretical foundations from an interpretive perspective, we see the need to approach situations with a significant degree of dissensus from a Habermasian perspective (Habermas, 1984; Sheffield, 2004; Sheffield and Guo, 2007. We hope that a focus on Habermasian validity claims will bridge the gap between reflective/ theoretical applications of critical perspectives and their practical application as facets of a design theory for collaborative technologies, including Group Support Systems. This aim is also supported by Boyd et al, 2007; Churchman, 1971; Cecez-Kecmanovic, 2005; Jackson, 2003; Lyytinen and Hirschheim, 1988; Lyytinen and Klein, 1985; Marshall and Brady, 2001; Metcalfe, 2008; Midgley, 2000, 2003; Mingers, 2001; Ngwenyama and Lee, 1997; Omerod, 2006; Rosenhead and Mingers, 2001; Ulrich, 1983, 2001a, b, 2007.

This research provides a retrospective account of a discourse theory of collaborative design that is aligned with the author's intuitive design, implementation, and evaluation of an

electronically-supported decision-making meeting for the regional growth forum. The report is organized as follows. Section 2 describes the discourse theory. Section 3 describes methodology. Findings from the periods before, during and after the meeting are reported in sections 4, 5, and 6, respectively.

2. Discourse theory of collaborative design

Habermas, and pragmatism in general, are key sources of theory for regional planners, especially those concerned with personal experience, collaborative techniques, institutional practice, and decision making (Forester, 1993a, b; Innes, 1996; Healey, 1997). This section develops a practice-oriented architecture for Habermasian discourses and operationalizes the resulting theory for use in scenario planning.

2.1. Habermasian discourses

Outhwaite (1996, p.12) claims that the central idea in Habermas' Theory of Communicative Action is remarkably simple. It is that every standard use of language to make statements involves certain presuppositions (claims to validity): that what the speaker says is true, that it is sincerely meant, and that it is normatively appropriate. Habermas gives the example of a professor asking a seminar participant to fetch a glass of water. The participant may question three types of validity: 1. Factual presupposition or objective truth that there is water available ("Is there water? Where is the water?"); 2. The normative appropriateness or rightness of such a request. ("Do you think we are in a restaurant?"); 3. The professor's sincerity or truthfulness in asking for it ("Are you kidding?"). Habermasian discourse evaluates three perspectives on knowledge.

Technical Perspective

The world of external nature, i.e., *how it is*, the technical world of material fact that is the totality of all entities about which objectively true statements are possible, or could be bought about by purposeful intervention. The mode of existence is objectivity. The mode of access is observation. The mode of validation is a critique of claims to objective truth.

Interpersonal perspective

Our world of society, i.e., *what we say*, the social world that is the totality of interpersonal relations legitimately regulated by contextual expectations or norms. The mode of existence is inter-subjectivity. The mode of access is participation. The mode of validation is a critique of claims to rightness.

Personal perspective

My world of internal nature, i.e., *why I feel*, the personal or subjective world that is the totality of the experiences to which the speaker or actor has privileged access. The mode of existence is subjectivity. The mode of access is experience. The mode of validation is a critique of claims to sincerity.

Habermasian discourses provide a standard of excellence for the reflective communicative action undertaken by two or more stakeholders in order to stabilize mutual understanding. Habermas defines an ideal speech situation as one in which all participants are free to question

any utterance on the basis of its truth content, rightness for the context, and/or sincerity of the speaker; and the speaker must be open to hearing and rationally responding to the questions that are asked. Power relations, that in other circumstances might allow some participants to ignore the perspectives of others, are set aside in favour of genuine dialogue. In the case of regional governance no individual stakeholder has sufficient power to dictate regional growth, and the statutory requirement for consultation is, in fact, adhered to. By necessity, power relations are negotiated in the mayoral forum along with individual stakeholder visions, mutually agreed requirements, and technically feasible solutions.

Habermas's direct engagement with concepts of rationality does not address all aspects of power (Brocklesby and Cummings, 1996; Kelly, 1994; Oliga, 1996), and in some circumstances may be unrealistic or utopian (Ulrich, 1983). However Habermas's normative theory is not inconsistent with a critical approach to knowledge (Jackson, 2005), and existing concepts about the facilitation of group decision (Dennis and Garfield, 2003; Gregory and Romm, 2001). Conflict among different humans (or within one reflective, yet conflicted, human) may usefully be understood in Habermasian terms as discourse that surfaces, tests, and integrates three perspectives on knowledge. For each knowledge perspective, prospective and retrospective reflections constitute separate discourses about collaborative intentions and outcomes, respectively. Group decision is seen as a collaborative process that seeks "rightness" in the fit (coherence) between evolving problem representation and solution hierarchies, each of which is defined by relations between personal values, interpersonal objectives and technical decision criteria (Shakun, 2003). Integration may be effected by discourses on intentions that proceed from the personal to the technical, followed by discourses on outcomes that proceed from the technical to the personal.

Each pair of discourses (intention and outcome) in the same knowledge perspective evaluates rationality via the relevant knowledge claim. Habermasian discourse develops and tests the coherence among intentions and outcomes via the gold standard of ideal speech i.e., social actors' emergent claims for valid technical, interpersonal and personal knowledge. The standard of excellence can be stated as follows: personal commitment (validated by truthfulness) to an interpersonal consensus (validated by rightness) for technical excellence (validated by objective truth) (Figure 3).

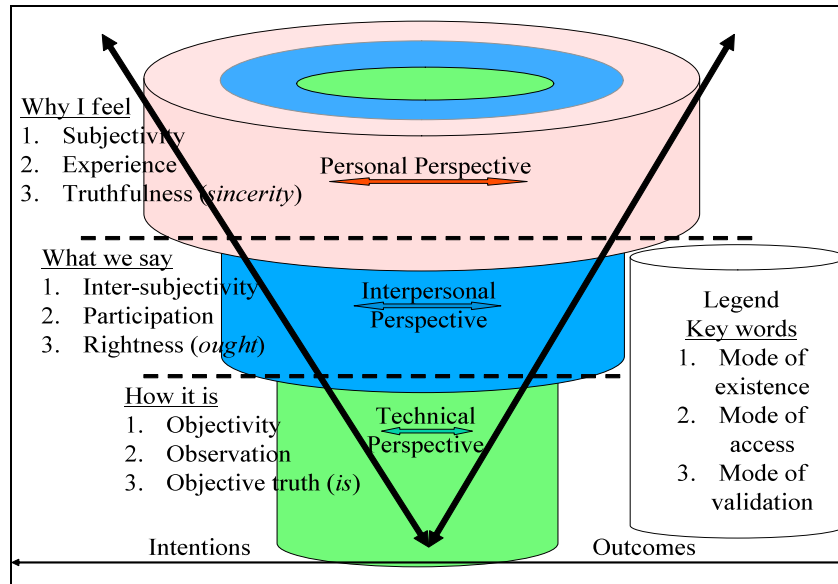


Fig. 3. Architecture of Habermasian discourses

2.2. Operationalization for comprehensive urban planning

Habermasian discourses and architecture serve as the archetype for mid-range theories useful in areas that require a critical appreciation of conflicting perspectives. Strategic planning involves the surfacing and testing of assumptions from multiple perspectives (Mitroff and Linstone, 1993). In dialectical terms a pair of perspectives is seen as an Hegelian thesis and antithesis (Millet and Gogan, 2005). Ignorance is reduced via active engagement with the confusion and conflict that is required to reconcile opposing perspectives and give birth to a new, more current synthesis. A common application of GSS technology is the support of groups engaged in strategic planning activities (Fjermestad and Hiltz, 2000; Shaw, Ackermann and Eden, 2003). Strategic planning is complex and lacks well-articulated theoretical assumptions (De Reuk, 2002) and guidelines for practice (Grinyer, 2000). Therefore a *mid-range operational model* was created for the purpose of developing and testing the coherence between intentions and outcomes via scenarios developed in the context of strategic planning (Figure 4).

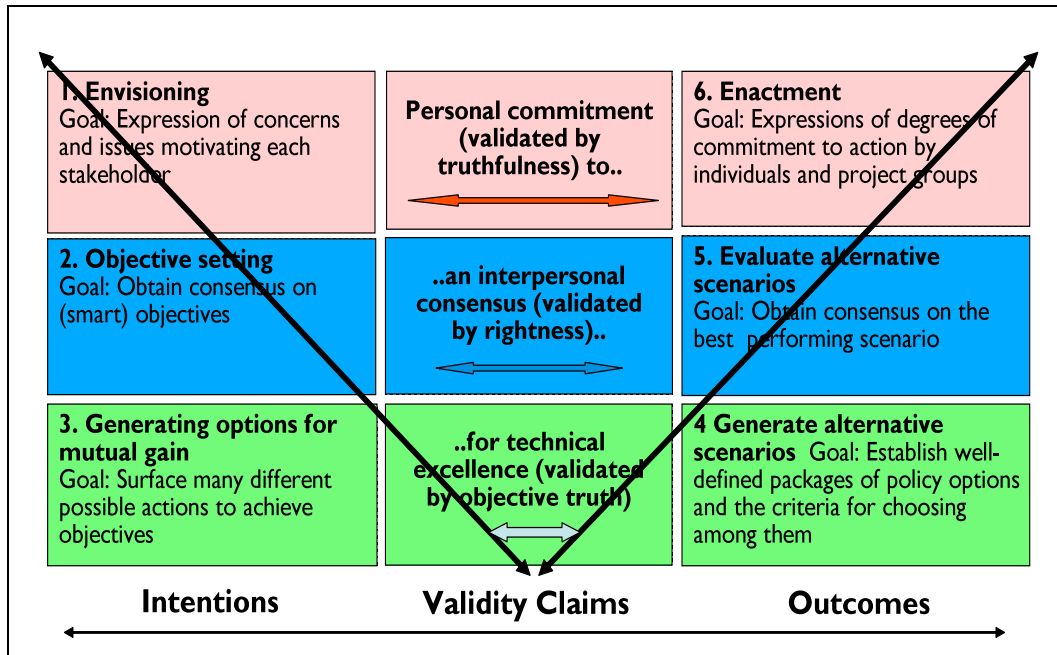


Fig. 4. Architecture of strategic scenario planning

3. Methodology

The practical value of the discourse theory of collaborative design developed in section two is explored in the context of an intervention enabled by Group Support Systems (GSS) in regional governance and comprehensive urban planning. This section describes the methodology by which empirical evidence is generated. The focus question is “Do electronic discourses enhance participant’s trust and understanding in scenario planning?” Because of the complexity of the issues, and the importance of power relations, and the emergent nature of their interactions, this question will be difficult to measure with precision. A non-positivist method of inquiry is adopted that draws on elements of pragmatism (Metcalf, 2008; Omerod, 2006), Churchmanian inquiring systems (Churchman, 1971), Hegelian dialectic (Millet and Gogan, 2005), and Habermas’s theory of communicative action (Habermas, 1984). In information systems research, Habermas is closely associated with reflective research of a theoretical nature (Ngwenyama, 2002) (Table 2). In regional planning, Habermas is employed in a practical manner to reduce confusion and conflict about existentially real decisions made in complex institutional settings. The research aims to apply the architectural frameworks developed in section 2 in a practical way to a complex decision made by the regional growth forum. The methodological findings are intended to contribute to the integration of all four quadrants in Table 2.

Table 2

A classification of 15 critical social theory information systems research papers

	Decisionistic	Reflective
Theoretical	2	11
Practical	1	1

The aim is to describe the general nature of the phenomena observed and to interpret actions, events, and consequences. The purpose of the methodology is to identify the evolution of validity claims through the pre-meeting, meeting, and post-meeting phases of decision making. Data is gathered before, during, and after an electronically-supported meeting. In the focal meeting evidence is also sought on participants' satisfaction with electronic discourse. The design of the GSS-enabled meeting reflects the following principles.

Technical Perspective

Present claims to objective truth via briefs by technical experts. Ensure that these are examined critically and the findings documented. The procedure for evaluating the evidence should be validated by a willingness to adopt a cognitive, objectivating attitude towards the facts.

Interpersonal Perspective

Enact claims to rightness via discussion among all those who are entitled to be represented. Ensure that the discussion addresses the role-based needs of stakeholders. The procedure for evaluating the evidence should be validated by full participation in a debate conducted under the norms of established legitimate inter-personal relationships.

Personal Perspective

Express claims to truthfulness by sincere disclosure of participants' subjectivity. Ensure that participants give voice to personal commitments and that periods of silence are provided as an aid to ethical self-reflection. The procedure for evaluation of evidence should be validated by aspirations that are unconstrained by technical issues and unrestrained by the inter-personal context.

Coherence

Assuming that emergent claims for valid technical, interpersonal and personal knowledge are established, ensure that they are coherent. An apparent contradiction (thesis and antithesis) should serve as a precursor to a Hegelian synthesis.

Overall Success

The practical application of the discourse theory of collaborative design should support the overall success of the meeting. Success is conceptualized in Churchmanian terms as a meeting that creates the capability of choosing the right means for one's desired ends. This requires participants to develop and integrate perspectives from generic roles that Churchman terms designer, decision maker and client (Churchman, 1971). More specifically, success is indicated by insight leading to a consensus model that provides decision makers with a rationale for action.

Evidence on the evolution of validity claims requires a study that is sensitive to the historical context. The data reported is part of a larger study that is a modified historical analysis. This report focuses on data collected in the key period, that is, the pre-meeting, meeting and post-meeting phases of the focal electronically-supported meeting. Sources include: notes on 50 hours of meetings and phone conversations with staff and consultants from a regional planning authority; direct observations and audio and video records of the focal eight-hour GSS-supported

meeting; in-depth study of the documented inputs (i.e. the briefing papers) and outputs (i.e. the electronic transcript) of the meeting; perceptions of participants gathered at the end of the meeting in both free-text and questionnaire form; in-depth study of the report of the strategic evaluation of growth options subsequently published by the regional planning authority (Auckland Regional Council, 1997).

The focal meeting is sponsored by mayors as part of the regional growth forum. The purpose of the meeting is the strategic evaluation of a comprehensive 30-year plan for the Auckland region. This plan, known as the Auckland Strategic Planning Model, had been constructed over a seven-year period. The plan describes three scenarios for an increase in population from 1m to 1.5m. *Consolidation* drives scenario one. More controls, particularly environmental controls, are imposed to limit the spread of population into rural areas. The result is higher population density and increased use of passenger transportation (buses, light rail). *Expansion* drives scenario three. Planning controls are relaxed, allowing the spread of population into rural areas. The result is lower population density and increased use of private transport (cars, freeways). Scenario two is an amalgam of the more desirable attributes that emerge from the development of scenarios one and three (Table 3).

Table 3

Evaluation criteria and scenarios

Evaluation criteria	Scenario one “consolidation”	Scenario three “expansion”,
A. \$Cost	More environmental, etc, planning controls; Higher density; More passenger transportation (buses, light rail)	Less environmental, etc, planning controls; Lower density; More private transport (cars, freeways)
B. Amenity & landscape		
C. Housing choice		
D. Access and transportation		
E. Water quality		

4. Before the meeting

The database of evidence gathered in the pre-meeting phase revealed that participants in the focal strategic planning meeting were there to represent seven territorial authorities (four cities and three districts) and the Auckland Regional Council (ARC) (Figures 1 and 2). Each was a professional planner responsible for advising his/her own (elected) council. In Churchman’s inquiring system, each participant is primarily a designer of an urban area for which the elected council is the decision maker, and those who live in the area are clients (Churchman, 1971). Each territorial authority constitutes one part of the whole of the Auckland region. The issues associated with embedding ‘one part’ of an urban region in ‘the whole’ are complex. The chief planner for the ARC advised that most participants have been involved in prior consultations marked to some degree by confusion and conflict. Participants recognized the difficulties in achieving the goals of their respective councils *and* engaging in consultations about comprehensive region-wide plans with planners from other councils. Perceptions of costs and

benefits varied with the allegiance of the participant and the history of his or her interactions. As the day of the focal electronically-supported meeting approached it became apparent that considerable difficulties were being experienced by ARC planners, and that these were directly related to technical, interpersonal and personal issues.

Technical perspective

The first set of problems was associated with the production of briefing documents that summarized the studies by technical experts. Economic analyses were delayed as those responsible attempted to produce estimated costs for major infrastructural projects some of which were at a conceptual stage of development. Technical difficulties were encountered in discovering an analytically sound method of combining knowledge from technical experts. Urban planning is an area that Banville and Landry (1989) would describe as 'lacking conceptual integration'. For example, traffic engineers focused on access and transportation and developed estimates of trip times under each scenario. Biologists studied coastal water quality and developed estimates of pollutants in parts per million. Financial analysts focusing on economic values developed quantitative estimates of costs. Other planning consultants developed qualitative assessments of amenity, landscape values and housing choice. Scientific methods were applied by the experts who developed sub-models in sub-disciplines embedded within urban planning. Yet measures such as trip times, pollutants and implementation costs are, by themselves, conceptually unrelated and cannot rigorously be compared. Claims to objective truth were diminished by the lack of an analytically sound method of combining knowledge from different sub-specialties.

Interpersonal perspective

The second set of problems was associated with ongoing confusion about the conceptual basis for stakeholders' evaluation of scenario options. As a consequence of the technical difficulties mentioned above, the briefing documents did not reflect the precision of the discrete idealized rows (criteria) and columns (options) of a decision matrix. Ways of expressing scenario options and criteria had continued to evolve throughout the seven year planning period. The traditional urban planning triple-bottom-line categories of economic, social and environmental concerns appeared to be interlinked in a way that made the separate evaluation of any one category or subcategory impossible. It became clear that there were complex, dynamic and recursive ('chicken and egg') or self-referential (Mingers, 2004; Müller, Tjallingii and Cantor, 2005) interdependencies among stakeholder's beliefs, potentially right scenarios and available objective facts. These emergent properties of the design process could only be resolved by discourse.

Personal perspective

The third set of problems was associated with personal commitments. Planners from one major territorial authority (a city of 300,000) were reluctant to attend because they were committed to a city plan based on presuppositions that differed from those of the regional council. The chief planner from another city announced on several occasions that views promulgated in a regional forum would not influence his commitment to success as determined by the views of his own council. Research notes from the pre-meeting phase revealed that the chief planner of the regional council, the sponsor of the focal meeting, was concerned about the intransigence of some participants. She had planned a half-day warm-up session to introduce the community of planners to the decision procedures to be used in the focal electronically-supported meeting. One week prior to the warm-up, she felt obliged to cancel because of a perceived lack of support.

Summary

Data gathered before the focal electronically-supported meeting reveals major problems. The empirical evidence is that the pre-meeting phase was fraught with technical, interpersonal and personal problems. There was little or no alignment between personal commitments, consensus and technical excellence. While some stakeholders may have preferred a more tractable problem, the evidence is that they were faced with a situation in which key aspects of the problem situation (intentions) and judgments about the “right” solution (outcomes) (Shakun, 2003) have yet to emerge holistically as themes in discourse at three levels – technical, interpersonal and personal. Analysis via the discourse theory of collaborative design suggests that the observed levels of guarantors (truth, rightness and truthfulness) immediately before the focal electronically-supported meeting were low.

5. During the meeting

The facilitator of the focal GSS-supported meeting chose to develop trust and mutual understanding by applying the concepts in the mid-range operational model (Figure 4). He visualized the purpose of the meeting as developing and testing the coherence among the validity claims illustrated in Figure 5. The first part of the meeting focused on expression of concerns and issues motivating each stakeholder. The last part of the meeting focused on expressions of degrees of commitment to action, for and against, any or all of the scenarios. More than half of the agenda items were devoted to electronically-supported discourse about the decision matrix. Three strategic scenarios (columns) were evaluated against five classes of criteria (rows) – cost, amenity and landscape, housing choice, access and transportation, and water quality (Table 3). In Churchman’s inquiring system, the urban planners are characterized as system designers who evaluate the decision matrix to provide insight about measures of performance (Churchman, 1971). The consensus of system designers on a preferred option provides decision makers (the councils that employ the planners) with a rationale for action. Each row of the decision matrix was the subject of a 50-minute session using the GroupSystems Topic Commenter tool (Sheffield, 2004). This 50-minute session included speech and the ordering by each participant of his or her preference for each scenario (Dias and Climaco, 2005).

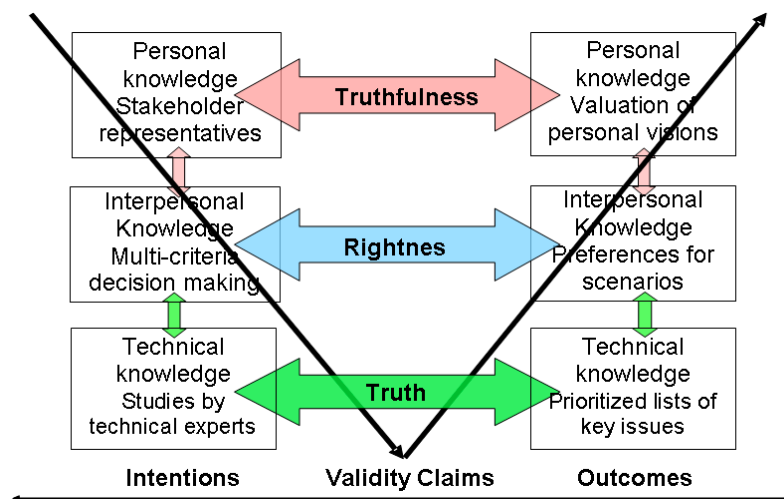


Fig. 5. Validity claims to be evaluated

Twenty one people attended the meeting, excluding the facilitator. Sixteen had voting rights. Ten of these were planning executives from the four cities and three districts in the urban area; six were ARC planners and consultants. The remaining five participants were the ARC planners responsible for the seven-year planning cycle. Data gathered on participants' satisfaction with electronic discourses as a means of reducing conflict and confusion about preferences for scenario options are presented in the following subsection.

5.1. Participant satisfaction with electronic discourse

Participant satisfaction with electronic discourses was solicited anonymously via structured and unstructured methods and the results compared with observational data. The electronic meeting technology used in the focal meeting provided two key functions important to reducing conflict and confusion. Firstly, the software provided automatic recording ('group memory') that enabled procedures for idea generation (divergent thinking) to be separated in time from procedures for information analysis (convergent thinking). Secondly, the technology provided a degree of anonymity that reduced the anxiety about surfacing sensitive issues. This enabled a separate focus on interlocked issues about relationships (trust) and cognition (understanding). A two-by-two analysis produced four separate measures of satisfaction with electronic discourse (Table 4).

A structured survey instrument was employed that includes scales for these four measures. The instrument, which has previously been used to evaluate electronically-supported strategic planning in the presence of inter-organizational conflict, was administered to all participants at the end of the electronically-supported meeting. The architecture of the instrument captures the distinctive V-shape of the process steps in Figures 3-5 and the "top-down" then "bottom-up" sequence depicted in Table 4 (Sheffield and Gallupe, 1994). Participants' satisfaction with electronic discourse averaged 6.0 on a 7 point scale (1 = low satisfaction, 7 = high satisfaction). Unstructured comments were collected anonymously from participants by means of the GroupSystems Topic Commenter tool. The responses were overwhelmingly positive. Participants remarked that the meeting generated goodwill and momentum. Many people expressed surprise that the technology existed and stated that the meeting outcomes would not have been possible without electronic support.

Table 4

Participants satisfaction with electronic discourse (1=low satisfaction; 7=high satisfaction)

Focus	Divergent procedure	Convergent procedure
Relationship issues –Reduced conflict –Increased trust	1. Absence of perceived conflict 6.1	4. Consensus for cooperative action 6.1
Substantive issues –Reduced confusion –Increased understanding	2. Participation 6.2	3. Information exchange 5.5

Observational data in the form of a video record showed that electronic discourses enabled participants to interact in silence for four hours in the eight-hour meeting. The atmosphere was one of intense concentration, as though each participant was committed to the success of a difficult challenge. It was observed that the resulting text received intense scrutiny during the meeting.

In summary, the satisfaction reported by participants and the observations during the meeting support the value of the electronic discourse. Participant's trust and understanding were increased. However the measures obtained are somewhat general and do not directly address the purpose of the meeting, i.e., to develop and test the coherence among the validity claims illustrated in Figure 5. The remainder of the report critiques the success of the meeting through the theoretical lens of the discourse theory of collaborative design.

5.2. Evaluation of claims to objective truth

Participants arrived at the meeting carrying extensive briefing documents that they had received in the mail. The video record showed that the initial expression of personal views was heated. It took some time before most participants were ready for mutual problem solving. Participants then examined the briefing documents in detail as they worked through each row (criterion) of the decision matrix. Each participant was a senior planning generalist and this part of the meeting provided the occasion for the exercise of technical skill. Through the use of the GroupSystems Topic Commenter tool participants produced ten pages of text on each criterion. This text or 'frozen discourse' includes key issues that were prioritized via a weighted voting procedure (Van de Ven and Delbecq, 1971).

Table 5

Evaluation of claims to truth

Criterion	Prioritized key issues
A: \$Cost	1 st Transport dominates the issue (44 pts) 2 nd Little difference – are options extreme enough? (27 pts)
B: Amenity and landscape values	Author's note: All except 15 th issue made no explicit mention of options (233 pts) 15 th Greater choice, diversity, variety in Option 1 (7 pts)
C: Housing choice	Author's note: No explicit mention of options in any of the key issues (240 pts)
D: Access and transportation	1 st Stuff all difference among options (40 pts) 2 nd Are we wasting money on public transport without major density increases? (25 pts)
E: Water quality	1 st Any option has significant sediment impacts (44 pts) 7 th Lack of difference among options (14 pts)

Table 5 illustrates the priority and nature of some key issues and the number of votes each received. Participants cast a total of 240 votes for each criterion. The issues were expressed in a manner that was exploratory rather than evaluative. For example, the issue of the extent to which population density must increase to make public transportation sufficiently viable is central to the choice between scenario one (consolidation) and scenario three (expansion). Yet at the end of a seven-year planning exercise that included extensive traffic modeling, the issue was raised as a question rather than as the evaluation of a factual proposition supported by expert analysis. No explicit mention of any of the scenario options was included in the top 14 key issues about criterion B (amenity and landscape) or in any of the key issues about criterion C (housing choice). The key issues on the remaining three criteria (cost, access and transportation, and water quality) provided no information about which scenario option was preferred. The detailed investigation of the briefing documents produced a consensus that studies by technical experts had failed to find significant difference between the scenario options. This constitutes support for the following interpretation.

Decision Outcome

Under the norms of a cognitive, objectivating attitude towards the facts, the ‘truth’ is that all three scenario options are equal.

5.3 Evaluation of claims to rightness

At the end of the discourse on a criterion, each participant privately recorded how well each scenario performed against that criterion. This is a more holistic measure than the key issues recorded in Table 5. Participants must interpret technical findings from the perspective of their own norms and values. Each scenario received a rating on a five-point ordinal scale from each voting participant. The aggregated ratings on each scenario were made accessible to each participant. The aggregate preference orderings for scenarios one and three are illustrated in Table 6.

Table 6

Evaluation of Claims to Rightness

Performance on Criterion	Scenario One Number who choose ++ / + / 0 / - / --	Scenario Three Number who choose ++ / + / 0 / - / --
A: \$Cost	3 <u>5</u> <u>6</u> 2 0	0 2 3 <u>6</u> <u>5</u>
B: Amenity and landscape values	4 <u>7</u> 3 1 1	3 1 3 <u>4</u> <u>5</u>
C: Housing choice	1 <u>7</u> 3 3 2	5 <u>7</u> 2 1 1
D: Access and transportation	<u>5</u> <u>7</u> 3 1 0	1 3 2 <u>5</u> <u>5</u>
E: Coastal water quality	5 1 4 4 2	0 1 2 3 <u>10</u>

Modal values are underlined. On criterion C (housing choice), scenario one and scenario three were rated equally. On the remaining four criteria, scenario one performed distinctly better than scenario three. Scenario two (which had been constructed as an amalgam of scenarios one and three) received ratings between those for scenarios one and three. All three scenarios had been developed through a consultative process over a seven-year period. This coupled with observations from the pre-meeting and meeting phases constitutes support for the following interpretation.

Decision Outcome

Under the norms of established legitimate inter-personal relationships, scenario one is more 'right' for us than scenario two or three.

5.4. Evaluation of Claims to Truthfulness

The discourses on truth and rightness were framed by the briefing documents on the three scenarios. In Hegelian terms, scenarios constitute beliefs (theses) about emergent policy options and evaluation criteria. The possibility existed that discourse would produce unexpected insights that reshaped beliefs about the rationality of the decision process itself (antithesis). The facilitator sought a process by which contradictions would emerge and synthesis could occur. After the time allocated for discourses framed by the briefing documents was exhausted participants were encouraged to express more personal judgments about the three scenarios. Electronic meeting technology supported electronic discourse on the question "What is it like to live in Auckland under scenarios 1, 2 and 3?" In Churchman's inquiring system, participants were being asked to drop their usual role of designer and adopt the role of client (Churchman, 1971). The goal was disclosure of speaker's subjectivity, unconstrained by the (technical) structure of the model and unrestrained by the interpersonal context. The strategy was to get each individual to: (i) write a personalized account of what it would be like to live in Auckland 30 years hence under each of options 1, 2 and 3; (ii) read the account of others to identify the most valuable visions. The procedure was a 60-minute silent envisioning exercise in which each account is identified only by a code. Anonymity was almost complete.

Table 7

Evaluation of claims to truthfulness

Personal preferences	Scenario One	Scenario Two	Scenario Three
Number of participants strongly in favor of	14	0	2
Number of participants indifferent to	0	16	0
Number of participants willing to work against	2	0	14

The video record shows that participants developed their personalized accounts with a silence and intensity reminiscent of students in a final exam. Some participants insisted on working on

their accounts beyond the time allocated. Their self-absorbed silence contrasted strongly with the shouted social consensus that accompanied the reading of the accounts of others. The most valued visions of what it would be like to live in Auckland 30 years hence showed intense personal support for scenario one, a lack of engagement with scenario two, and a willingness to work against scenario three (Table 7).

Decision Outcome

Under the norms of disclosure of speakers' subjectivity, 14 of the 16 participants will, in all truthfulness, only support Option 1.

5.5. Summary

The positive results obtained from the meeting are in strong contrast to the confusion and conflict that existed at the end of the pre-meeting phase. Participants' perceptions and performance as a result of the electronic meeting technology were positive. Participants were satisfied. These findings are similar to those in the meta-analysis reported in (Fjermestad and Hiltz, 2000). While some participants had been reluctant to attend the focal meeting, and expressed negative views at the beginning of the meeting, all participants provided positive evaluations at the end of the meeting. The functionality of the GSS software was supportive of an overall positive result. Participation by all participants was intense. By the end of the meeting, electronic discourse produced 80 pages of text. Intense participation in four key aspects of electronic discourse (Table 4) resulted in each of the three decision outcomes being documented and grounded in the corresponding validity claim. The data gathered during the focal meeting support the claim that electronic discourse had successfully reduced conflict and confusion. It is not clear, however, that the decision outcomes integrated the technical, inter-personal, and personal perspectives into a consensus model that provided a rationale for action.

6. After the meeting

A 'valid' and 'coherent' evaluation of the three scenario plans is desired. We have yet to consider the degree of coherence among the three perspectives. Participants found no difference between the scenarios on the basis of technical knowledge. Moderate claims in favor of scenario one were made based on interpersonal knowledge. Strong claims in favor of scenario one were made based on personal knowledge.

The degree of coherence among the decision outcomes at different levels is poor. There is a major discrepancy in preferences at various stages of the decision process. The 80-page report generated by electronic meeting technology (from which the data in tables 5, 6 and 7 are extracted) was circulated to all participants immediately after the meeting. The introductory section of the report highlighted the fact that the participants were strongly supportive of an option that lacked factual support. The report became subject to intense scrutiny. Regional planners met repeatedly among themselves about the report and consulted other meeting participants. Support grew for the interpretation that the information in Table 5 should be taken at face value – the scenario options were not extreme enough. In Hegelian terms, the dialectical logic (synthesis) of this interpretation was initially lost on the regional planners because they were so firmly wedded to their decision framework (thesis) that they experienced profound difficulty in recognizing that the framework was flawed (antithesis). An abbreviated planning round was subsequently undertaken with more extreme variations on scenarios one and three

(based on a 100% increase in population) and support was found for scenario one at technical, interpersonal and personal levels.

6.1. Discussion

Support has been found that framing the electronic discourses as an instance of the design theory for collaborative technologies reduces participants' conflict and confusion about a comprehensive urban plan and preferences for three scenario options. The meeting enabled bounds to rationality to be loosened by active testing of each participant's knowledge against other points of view. Intense scrutiny of the meeting report produced a significant increase in the coherence of the belief structures of meeting participants. Specifically, the apparent contradictions in preferences surfaced at different stages of the meeting served as a precursor to a Hegelian synthesis. Participants' insight that the model was flawed led to consensus on a modified decision framework that provided decision makers with a rationale for action. Using the definition of success in Churchman's inquiring system ("insight leading to a consensus model that provides decision makers with a rationale for action"), the meeting was a success.

6.2. Conclusion

The paper applies a design theory for collaborative technologies to a particular collaborative technology, Group Support Systems (GSS), and a particular problem domain, comprehensive urban planning. The discourse theory of collaborative design produced a successful meeting. The learning process did not produce a coherent decision based on the initial parameters in the planning model, but an appreciation of the gap between the model and the purpose for which it had been developed. After the meeting consensus developed around a new urban planning model synthesized from suggestions by meeting participants. Ten years after the electronically-supported meeting, the essence of the decision in favour of scenario one remains the accepted plan for the future of the Auckland region.

In totality, the empirical evidence suggests that electronic discourses enhanced participant's trust and understanding in scenario planning. The benefits were three-fold:

Technical perspective

Support for the development and documentation of validity claims about objective truth, rightness and personal truthfulness or sincerity, and the degree of coherence among them.

Interpersonal perspective

Support for discourse that interweaves evidence (reflections and experiences, decisions and actions, theories and interpretations, individual feelings and objective facts) from multiple, conflicting yet mutually supportive evaluative frames.

Personal perspective

Support for the 'psychological safety' and 'trust' needed for direct and unreserved expressions of multiple, conflicting individual perspectives.

This retrospective inquiry was initially born out of a personal concern that the subjectivist story-telling aspects of the design of the GSS session could not be justified, and that harm may result. This appears not to be the case. Retrospective inquiry has enabled the GSS facilitator to

find that his intuitions about session design are shared by others. Several lessons have been learned. *Firstly*, creativity and conflict are intertwined. An element of self expression via story-telling may get us closer to success than available empirical data. *Secondly*, individual and group knowledge is mediated and situated, provisional and pragmatic, aspirational and contested. Electronic discourses proved useful in teasing out intertwined technical, interpersonal and personal issues. *Thirdly*, GSS technology has a raw power that the facilitator may direct via the application of a design theory for collaborative technologies. The author has found the architecture of discourse theory of collaborative design a useful archetype for mid-range operational models in various domains. *Fourthly*, the methodology of a critical interpretive case study is recommended in situations involving dissensus. For example, a critical approach is required to study why participants sometimes act inauthentically in their participation in collaboration technologies, or avoid them completely as communication closes down in response to unresolved conflict.

The discourse theory of collaborative design extends the practical and decisionistic applications of critical research in information systems, and bridges the gap between positivist technology-based theories of collaborative design and critical interpretive accounts of governance and power relations associated with inter-organizational conflict. In practice, elements of dissensus – confusion and conflict - are integral to collaboration. These are the experiences required to disambiguate a mess of facts, norms and feelings. Seen from a Hegelian perspective, the power of a design theory for collaborative technologies based on electronic discourse lies not in achievement of enlightenment, but in appreciation of the nature of ignorance and the practical consequences of belief.

7. References

- Ackermann F, Franco, LA, Gallupe B, Parent M. 2005. GSS for Multi-Organizational Collaboration: Reflections on Process and Content. *Group Decision and Negotiation* **14**: 307-331.
- Auckland Regional Council. 1997. *Auckland Strategic Planning Model (ASP2): Second Round Summary Report*, Auckland.
- Banville C. Landry M. 1989. Can the Field of MIS be Disciplined? *Communications of the ACM* **32**(1): 48-60.
- Boland R. 1978. The Process and Product of System Design. *Management Science* **28**(9): 887-898.
- Boyd A, Geerling T, Gregory WJ, Kagan C, Midgley G, Murray P, Walsh MP. 2007. Systemic Evaluation: A Participative, Multi-Method Approach. *Journal of the Operational Research Society* **58**: 1306-1320.
- Briggs R, Nunamaker J, Sprague R. 2004. Introduction to the Special Issue: Information Systems Design-Theory and Methodology. *Journal of Information Systems*, **20**(4): 5-8.
- Brocklesby J, Cummings S. 1996. Foucault Plays Habermas: An Alternative Philosophical Underpinning for Critical Systems Thinking. *Journal of the Operational Research Society* **47**(6): 741-754.

- Churchman CW. 1971. *The Design of Inquiring Systems*, Basic Books, New York.
- Cecez-Kecmanovic D. 2005. Basic Assumptions of the Critical Research Perspectives in Information Systems. In Howcroft D, Trauth E (eds.) *Handbook of Critical Information Systems Research: Theory and Application*, Edward Elgar, Aldershot, pp. 19-46.
- De Reuk, J. 2002. General Decision Assurance Principles and Procedures for Strategic Planning. *International Journal of Management & Decision Making* **3**(2): 139-150.
- Dennis AR, Garfield J. 2003. The adoption and use of GSS in project teams: Towards more participative processes and outcomes. *MIS Quarterly* **27**(2): 289-323.
- Dias L, Climaco J. 2005. Dealing with Imprecise Information in Group Multi-Criteria Decisions: A Methodology and a GDSS Architecture. *European Journal of Operational Research* **160**(2): 291.
- Fjermestad J, Hiltz SR. 2000. Group Support Systems: A Descriptive Evaluation of Case and Field Studies. *Journal of Management Information Systems* **17**(3): 115-159.
- Forester J. 1993a. *Critical Theory, Public Policy, and Planning Practice: Toward a Critical Pragmatism*, State University of New York Press, Albany.
- Forester J. 1993b. Learning From Practice Stories: The Priority of Practical Judgment. In Fischer F, Forester J. (eds.) *The Argumentative Turn in Policy Analysis and Planning*, Duke University Press, Durham, NC, pp. 186 – 209.
- Franco LA. 2008. Facilitating Collaboration with Problem Structuring Methods: A Case Study of an Inter-Organisational Construction Partnership. *Group Decision and Negotiation* **17**: 267-286.
- Gregory WJ, Romm NRA. 2001. Critical Facilitation: Learning through Intervention in Group Processes. *Management Learning* **32**: 453-467.
- Grinyer P. 2000. A Cognitive Approach to Group Strategic Decision Taking: A Discussion of Evolved Practice in the Light of Received Research Results. *Journal of the Operational Research Society* **51**(1): 21-35.
- Guo Z, Sheffield J. 2008. A Paradigmatic and Methodological Examination of Knowledge Management Research: 2000-2004. *Decision Support Systems* **44**: 673-688.
- Habermas, J. 1984. *The Theory of Communicative Action Volume 1: Reason and the Rationalization of Society*, trans. by Thomas McCarthy, Beacon Press, Boston.
- Healey P. 1997. *Collaborative Planning: Shaping Places in Fragmented Societies*, Palgrave New York.
- Hevner, AR, March, ST, Park J, Ram S. 2004. Design Science in Information Systems Research. *MIS Quarterly* **28**(1): 75-105.
- Innes JE. 1996. Planning Through Consensus Building. *Journal of the American Planning Association* **62**(4): 460-472.
- Jackson MC. 2003. *Systems Thinking: Creative Holism for Managers*. John Wiley and Sons, Chichester.

- Jackson MC. 2005. Reflections on knowledge management from a critical systems perspective. *Knowledge Management Research and Practice*, 3(4): 187-196.
- Kelly M. 1994. *Critique and Power: Recasting the Foucault/Habermas Debate*. MIT Press, Cambridge, MA.
- Klein HK, Myers MD. 1999. A Set of Principles for Conducting and Evaluating Interpretive Field Studies in Information Systems. *MIS Quarterly*, **23**(1): 67-93.
- Kolfschoten GL, Den Hengst-Bruggeling M, De Vreede GJ. 2007. Issues in the Design of Facilitated Collaboration Processes. *Group Decision and Negotiation* **16**:347-361.
- Lee AS. 1994. Electronic Mail as a Medium for Rich Communication: An Empirical Investigation Using Hermeneutic Interpretation. *MIS Quarterly* **18**(2): 143-157.
- Lewis FL, Bajwa DS, Pervan G, King VLK, Munkvold BE. 2007. A Cross-Regional Exploration of Barriers to the Adoption and Use of Electronic Meeting Systems. *Group Decision and Negotiation* **16**: 381-398.
- Lyytinen K, Hirschheim R. 1988. Information Systems as a Rational Discourse: An Application of Habermas' Theory of Communicative Action. *Scandinavian Journal of Management Studies* **4**(1-2): 19-30.
- Lyytinen K, Klein HK. 1985. The Critical Theory of Jurgen Habermas as a Basis for a Theory of Information Systems. In Mumford E. Hirschheim RA. Fitzgerald G. Wood-Harper T. (eds.) *Research Methods in Information Systems*, Amsterdam: North-Holland.
- Markus ML, Majchrzak A, Gasser L. 2002. A Design Theory for Systems That Support Emergent Knowledge Processes. *MIS Quarterly*, **26**(3): 179-212.
- Marshall N, Brady T. 2001. Knowledge Management and the Politics of Knowledge: Illustrations from Complex Products and Systems. *European Journal of Information Systems* **10**(2): 99-112.
- Metcalf M. 2008. Pragmatic Inquiry. *Journal of the Operational Research Society* **59**: 1091-1099.
- Midgley G. 1992. Pluralism and the legitimation of systems science. *Systems Practice* **5**: 147-172.
- Midgley G. 2000. *Systemic Intervention: Philosophy, Methodology, and Practice*, Kluwer Academic / Plenum, New York.
- Midgley G. 2003. (ed.) *Systems Thinking*, Sage, London.
- Millet I, Gogan J. 2005. A Dialectical Framework for Problem Structuring and Information Technology. *Journal of the Operational Research Society*, **57**: 434-442.
- Mingers J. 2001. Combining IS Research Methods: Towards a Pluralist Methodology. *Information Systems Research* **12**(3): 240-259.
- Mingers J. 2004. Real-izing Information Systems: Critical Realism as an Underpinning Philosophy for Information Systems, *Information and Organization* **14**: 87-103.

- Mitroff II, Linstone HA. 1993. *The Unbounded Mind: Breaking the Chains of Traditional Business Thinking*, Oxford University Press, New York.
- Müller DB, Tjallingii SP, Cantor KJ. 2005. A Transdisciplinary Learning Approach to Foster Convergence of Design, Science and Deliberation in Urban and Regional Planning, *Systems Research and Behavioral Science* **22**(3): 193-208.
- New Zealand Council for Infrastructure Development. 2008. *Strengthening Auckland Governance*.
- Ngwenyama O. 2002. The Critical Social Theory Approach to Information Systems: Problems and Challenges. In Myers MD, Avison D. (eds.) *Qualitative Research in Information Systems*, Sage, London.
- Ngwenyama OK, Lee AS. 1997. Communication Richness in Electronic Mail: Critical Social Theory and the Contextuality of Meaning. *MIS Quarterly* **21**(2): 145-167.
- Olga J. 1996. *Power, Ideology, and Control*. Plenum, New York.
- Omerod R. 2006. The History and Ideas of Pragmatism. *Journal of the Operational Research Society* **57**, 892-909.
- Outhwaite W. 1996. *The Habermas Reader*, Polity Press, Cambridge, UK.
- Rosenhead J, Mingers J. (eds.) 2001. *Rational Analysis For a Problematic World Revisited*. John Wiley and Sons, Chichester.
- Royal Commission on Auckland Governance <http://www.royalcommission.govt.nz>
- Schultze U, Leidner DE. 2002. Studying Knowledge Management in Information Systems Research: Discourses and Theoretical Assumptions. *MIS Quarterly* **26**(3): 213-242.
- Shakun MF. 2003. Right Problem Solving: Doing the Right Thing Right. *Group Decision and Negotiation* **12** (6): 463-476.
- Shaw D, Ackermann F, Eden C. 2003. Approaches to Sharing Knowledge in Group Problem Structuring. *Journal of the Operational Research Society* **54**(9): 936-948.
- Sheffield J. 2004. The Design of GSS-Enabled Interventions: A Habermasian Perspective. *Group Decision and Negotiation* **13**(5): 415-436.
- Sheffield J, Gallupe B. 1994. Using Group Support Systems to Improve the New Zealand Economy, Part II: Follow-Up Results. *Journal of Management Information Systems* **11**(3): 135-153.
- Sheffield J, Guo Z. 2007. Ethical Inquiry in Knowledge Management," *International Journal of Applied Systemic Studies* **1**(1): 68-81.
- Trauth EM, Jessup LM. 2000. Understanding Computer-Mediated Discussions: Positivist and Interpretive Analyses of Group Support System Use. *MIS Quarterly* **24**(1): 43-79.

- Ulrich WA. 1983. *Critical Heuristics of Social Planning: A New Approach to Practical Philosophy*. Haupt, Berne.
- Ulrich WA. 2001a. Philosophical Staircase for Information Systems Definition, Design, and Development: A Discursive Approach to Reflective Practice in ISD (Part 1). *Journal of Information Technology Theory and Application* **3**(3): 55-84.
- Ulrich WA. 2001b. Critically Systemic Discourse: A Disursive Approach to Reflective Practice in ISD (Part 2). *Journal of Information Technology Theory and Application*, **3**(3): 85-106.
- Ulrich WA. 2007. Philosophy for Professionals: Towards Critical Pragmatism. Viewpoint, *Journal of the Operational Research Society* **58**: 1109-1113.
- Van de Ven AH, Delbecq AL. 1971. The Effectiveness of Nominal, Delphi, and Interacting Group Decision Making Processes. *Academy of Management Journal* **17**: 605-621.
- Walls J, Widmeyer GR, El Sawy OA. 2002. Building an Information System Design Theory for Vigilant EIS. *Information Systems Research* **3**(1): 36-59.
- Walsham G. 1995. The Emergence of Interpretivism in IS Research. *Information Systems Research* **6**(4): 376-394.