Towards a Design Theory for Collaborative Technologies

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Abstract

This article proposes a design theory for collaborative technologies based on pragmatism and multiple discourses (Habermas 1984; Schultze and Leidner, 2002). The design principles directly address the issues of governance and power relations, and accept that elements of dissensus – confusion and conflict - are integral to collaboration. The resulting theory complements Information Systems design theories, and the engineering of collaboration in organizations, that more directly address issues associated with the IT artifact. The design theory is grounded in a particular collaborative technology, Group Support Systems (GSS), and a particular problem domain, comprehensive urban planning. The application of the design theory is described in a companion paper entitled 'Habermasian analysis of comprehensive urban planning'.

Keywords

Collaboration systems, inter-organizational conflict, governance, strategic urban planning

1. INTRODUCTION

This paper proposes a design theory for collaborative technologies based on some ideas about pragmatism [1, 2] and systemic intervention [3, 4]. The findings from applying the design theory to a practical problem is described in a companion paper entitled 'Habermasian analysis of comprehensive urban planning'. The dual focus on concepts and practical experience is in the tradition of enquiring systems [5], problem structuring methods [6], systems thinking [7, 8], and critical pragmatism [9]. The purpose is to identify the concepts of rationality associated with different discourses [10], and to propose a discourse-based design theory for collaborative technologies [11]. The design principles directly address the issues of governance and power relations, and accept that elements of dissensus – confusion and conflict - are integral to collaboration. The resulting theory complements Information Systems design theories [12, 13], and the engineering of collaboration in organizations [14], that more directly address issues associated with the IT artifact.

The design theory is grounded in a particular collaborative technology, Group Support Systems (GSS), and a particular problem domain, 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 a priori 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 look after the interests of 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.

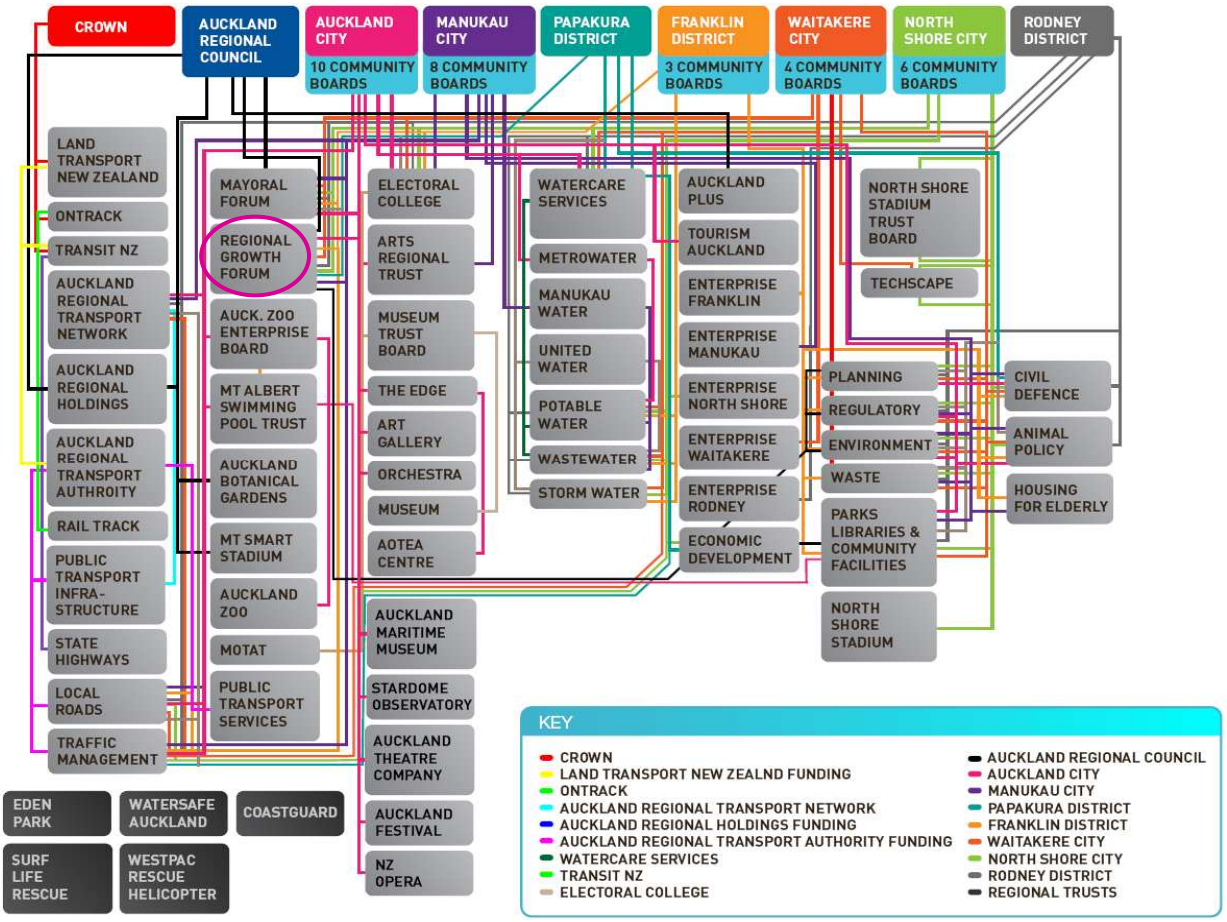
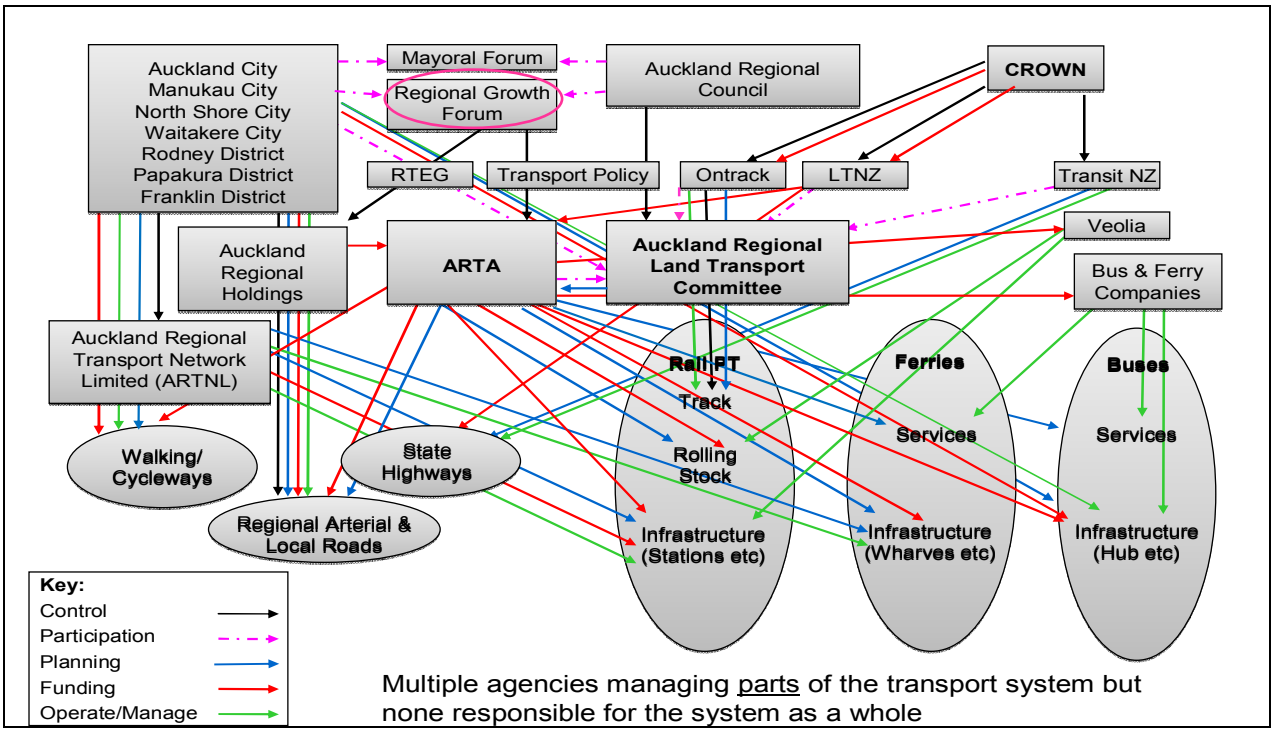


Figure 1. Governance of the Auckland region [15]

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 operational /management. Each organization manages a 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 [15, 16]. (Figure 2)



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? [17] What roles and responsibilities will be recognised? [18] Is it sensible to expect powerful stakeholders to use collaborative technologies when it introduces unwanted accountability and makes their exercise of power more difficult? [10, 19] By what concept(s) of rationality or validity should the facilitator be held accountable for a positive outcome? [20] Concepts to guide a systemic intervention, and illuminate the complexity of the issues in which these decision makers are embedded, must draw on multiple perspectives [21] (Table 1).

Table 1. Research paradigms. Adapted from [21].

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' world	Active involvement with stakeholders to surface illusions and to implement alternatives that will improve their world
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	Truthfulness in self-understanding, and sincerity in expression

While [12-14, 22] offer design support and theoretical foundations from a positivist perspective, and [23-27] 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 [11, 28, 29]. 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, such as group decision support. This aim is also supported by [1-9, 30-37].

This research provides a retrospective account of a discourse theory 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 the methodology for application, and section 4 provides a brief discussion.

2. DISCOURSE THEORY

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 [38-41]. 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) [25] 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 inquiry evaluates three perspectives on knowledge.

Technical Perspective

The least inclusive, lowest or most embedded level is 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 objective truth.

Interpersonal perspective

The middle level is 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 rightness.

Personal perspective

The most inclusive, holistic or highest (i.e., most aspirational) level is 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 truthfulness.

Habermasian discourses provide a standard of excellence for the reflective communicative action undertaken by two or more stakeholders in order to stabilize mutual understanding. Conflict among different humans (or within one reflective, yet conflicted, human) is understood by surfacing, testing, and integrating discourses on three perspectives on knowledge. For each knowledge perspective, prospective and retrospective reflections constitute separate discourses that surface 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 [43]. 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 intentionality (rationality) via the relevant knowledge claim. Habermasian inquiry 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 stated as follows: personal commitment (validated by truthfulness) to an interpersonal consensus (validated by rightness) for technical excellence (validated by objective truth) (Figure 1).

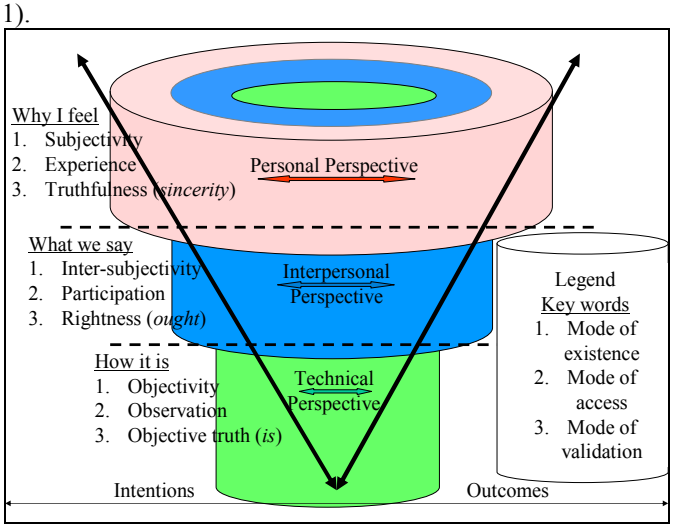


Figure 1 Architecture of Habermasian discourses

2.2. Operationalization for comprehensive urban planning

Habermasian discourses and architecture may 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 [44]. In dialectical terms a pair of perspectives is seen as an Hegelian thesis and antithesis [45]. 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 [46, 47]. Strategic planning is complex and lacks well-articulated theoretical assumptions [48] and guidelines for practice [49]. 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 2).

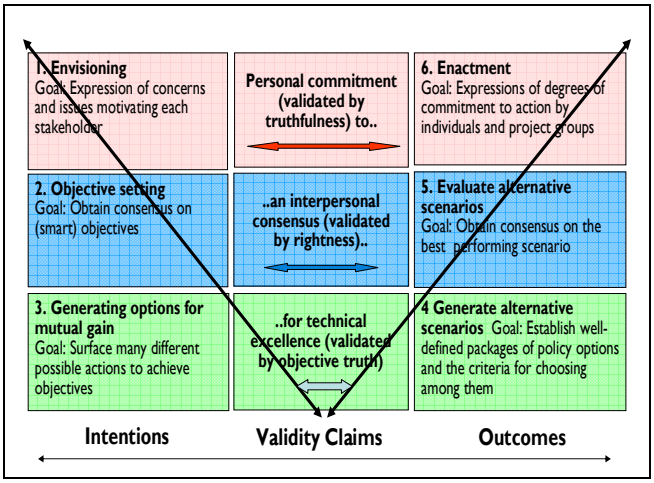


Figure 2. Architecture of strategic scenario planning

3. METHODOLOGY

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 [1, 2], Churchmanian enquiring systems [5], Hegelian dialectic [17], and Habermas's theory of communicative action [11]. In information systems research, Habermas is closely associated with reflective research of a theoretical nature [18]. (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 of Habermasian electronic discourse*.

Technical Perspective

Are claims to objective truth presented via briefs by technical experts? Are these critically examined and documented? Is the procedure for evaluating the evidence validated by a willingness to adopt a cognitive, objectivating attitude towards the facts?

Interpersonal Perspective

Are claims to rightness enacted via the inclusion of all those who are legitimately entitled to be represented? Is the procedure for evaluating the evidence validated by full participation in a debate conducted according to the professional norms of the participants?

Personal Perspective

Are claims to truthfulness expressive of participants' subjectivity? Are periods of silence provided as an aid to ethical self-reflection? Are participant's aspirations unconstrained by technical issues and unrestrained by the interpersonal context?

Coherence

Assuming that emergent claims for valid technical, interpersonal and personal knowledge are established, are they coherent? Do apparent contradictions (thesis and antithesis) serve as precursors to an Hegelian synthesis?

Overall Success

Does Habermasian electronic discourse lead to 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 [5]. 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 [19].

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. It developed 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 a 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 B. Amenity & landscape C. Housing choice D. Access and Transportation E. Water Quality	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)

4. DISCUSSION

The proposed design theory for collaborative technologies is directly based on the evolution of Habermasian validity claims over the period of an intervention. Emergent knowledge processes are evaluated by the growth of understanding in interlinked knowledge worlds. It is noted that discourses on intentions that proceed from the personal to the technical, followed by discourses on outcomes that proceed from the technical to the personal, as in figures 1 and 2, resonates with process-oriented models of practice in various domains, including strategic planning, programme audit, project management, group decision, research design, and report writing. A limitation of the Habermasian approach is the need for a thorough investigation of how the concepts apply in each and every case.

The generic design theory is grounded in a single collaborative technology, Group Support Systems (GSS), and a single problem domain, comprehensive urban planning. An example was provided of how the generic design theory may be customized to meet the requirements of a specific domain, viz, the development and evaluation of scenario planning options (Figure 2). The methodology for evaluating the application of the theory to a Group Support Systems (GSS) - enabled intervention in comprehensive urban planning was described. It is suggested that the methodological weakness associated with high levels of theoretical abstraction can be managed by intervention methods associated with context-sensitive mid-range models. The findings from this application is described in a companion paper entitled 'Habermasian analysis of comprehensive urban planning'.

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