

Feedback Models for Collaboration and Trust in Crisis Response Networks

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Crisis Response Networks

- ▶ Interorganizational relationship formats
 - Centralized control (channel captain)
 - ▶ Longer-term (strategic partnerships) or ad hoc
 - Unmanaged arrangements between unrelated organizations
 - Newest hybrid: unmanaged ad hoc networks
 - ▶ Frequently used in crisis response (disaster, humanitarian)
 - ▶ "Hastily formed networks"

Research problem

- ▶ How to coordinate ad hoc disaster response networks?
 - No acknowledged central authority
 - Goal “semi-compatibility”
 - ▶ Some shared goals, some unique goals
 - Task characteristics (intense, chaotic...)

Feedback loops

- Some (possible) confusion between cybernetics and social science interpretations (e.g., Richardson 1999)

	Cybernetics	Social Science
Positive feedback	Deviation amplifying	"Good" (assumes deviation is "good", i.e., away from undesired state)
Negative feedback	Deviation minimizing	"Bad" (assumes deviation is "bad", i.e., toward undesired state)

Feedback loops

	Deviation amplifying (Positive movement relative to normative state)	Deviation counteracting (Negative movement relative to normative state)
Self-reinforcing (Positive movement relative to factual state)	Undesired change (Crisis; pulled farther from desired stability)	Desired change (Development; movement away from undesirable status quo)
Self-correcting (Negative movement relative to factual state)	Undesired permanence (Stagnation; kept from desired change)	Desired permanence (Stability; deviations from desired normative state of stability are continually corrected)

(Adapted from Masuch (1985))

Building Coordination Through Feedback Loops

Resource commitment by Org 1

- Signals Org 1 trustworthiness (credibility, benevolence)
- Leads Org 2 to trust org 1
- Increases Org 2 commitment to relationship with Org 1
- Increases Org 2 commitment of resources to relationship with Org 1
- Increases resource commitment by Org 1

Self-reinforcing, deviation counteracting feedback loop that pulls away from undesirable status quo of no relationship or a lack of coordination

Building Coordination Through Feedback Loops

Effective communication strategy by Org 1

- Signals Org 1 trustworthiness (credibility, benevolence)
- Leads Org 2 to trust org 1
- Increases Org 2 commitment to relationship with Org 1
- Increases Org 2 information flow to Org 1
- Increases information flow by Org 1 to Org 2

Self-reinforcing, deviation counteracting feedback loop that pulls away from undesirable status quo of no relationship or a lack of coordination

Design Parameters

► Overarching proposition:

Reciprocal resource commitments and collaborative communications

- greater trust and relationship commitment
- network characteristics

Constructs and Variables

Design Space

▶ Resource commitment

- Likert scale (1 = very little commitment, 7 = substantial commitment)
- See, e.g., Daugherty, Autry and Ellinger 2001

▶ Collaborative commitment

- Frequency, bidirectionality, formality, coerciveness
- Adapted from Mohr, Fisher and Nevin (1996)

Constructs and Variables: Functional Constraints

- ▶ Communication system
- ▶ Infrastructure
 - Physical
 - Economic
- ▶ Scale/scope of crisis

Constructs and Variables: Criteria Space

- ▶ Network characteristics (Burt 1980; Gulati 1998; Lorenzoni and Baden-Fuller 1995)
 - Member status (centrality, prestige)
 - ▶ Centrality, degrees of separation
 - Member relationships (range, density, embeddedness)
 - ▶ Counts for range, density of ties
 - Dominant organization(s)
 - Speed of formation
 - ▶ Simple count (minutes)

Constructs and Variables: Criteria Space

► Relational governance

- Trust (adapted from Kumar, Scheer and Steenkamp 1995)
- Relationship commitment (adapted from Morgan and Hunt, 1994; Anderson and Weitz 1989)

Relationships

► Propositions

- Greater resource commitment and collaborative communication → greater trust and relationship commitment
 - Trust both direct and indirect (moderating) effect
- Greater trust and relationship commitment positively associated with network characteristics
 - Strength of ties, number of ties
- Greater resource commitment and collaborative communication → faster network formation
- Infrastructure and crisis scope will moderate effects

Pareto Set

- ▶ Networks develop over time (relative to crisis duration)
 - Ties form, strengthen, change
 - Clusters form, change
- ▶ Time is critical in crises
- ▶ Pareto set: trade time for stronger network relationships
 - Stronger = longer to form, more effective response?
 - Weaker = form sooner, respond faster (less effectively?)

Campaign of experimentation: Discovery phase

- ▶ Part 1: Qualitative interviews of crisis response participants (e.g., HFN participants)
 - Assess constructs for feasibility and utility
 - Ground research in real-world data
 - Conduct and analysis using accepted qualitative techniques (e.g., Glaser and Strauss 1967; Rubin and Rubin 2005)

Campaign of experimentation: Discovery phase

▶ Part 2: Table-top simulation

- Tests patterns of resource commitment and collaborative communication--feedback loop?
- Tests patterns of network formation
 - ▶ Centrality, strength and number of ties, etc.
- Participants
 - ▶ NPS students
 - ▶ Collaborative software (Groove?)
 - ▶ Analysis by session coding on constructs above

Campaign of experimentation: Hypothesis testing

► Part 1: Second simulation

- Similar to first in design
- Different scenario
- Add interviews and/or surveys to assess formally hypothesized relationships
- Analyze sessions (coding) and interview/survey results

Campaign of experiments: Hypothesis testing

► Part 2: Field exercise

- Scenario based
- Small network construction
- Random assignment to teams
- Disproportionate resource allocation
- Analysis: observed data and post-hoc interviews/surveys
- Adds real-world element

Limitations

- ▶ Some, but experimental campaign mitigates
 - Qualitative limitations (discovery phase)
 - ▶ External validity, perceived rigor
 - ▶ Strength in discovery phase
 - Simulation limitations
 - ▶ External validity: offset by military “exercises”, multiple scenarios
 - ▶ Internal validity: random assignment, longitudinal
 - But not so long as to risk maturation
 - Mortality not a risk (network members can leave in real world)