Literature Review Methods:
Point of Departure

Kathleen Liston
Why Literature Review?

Developing POD involves literature review at every phase of research.

Frames and guides research.

Meeting-Based Framework of AEC Team Information Use and Action: An Information-Action Perspective

RESEARCH TASKS
- Observe Meetings
- Develop/Refine Taxonomy, Coding
- Process
- Apply Taxonomy, Coding, and Analysis - Compare against other coding and performance metrics

RESEARCH QUESTIONS
- What conversation-based framework models relationship between meeting tasks, AEC project models, information use, and meeting performance?
- How can (1) be applied to compare information representation methods, e.g., paper vs. interactive-based?

RESEARCH RESULTS
- Meeting Task Taxonomy and Coding Scheme validated with inter-coder reliability, use by others, and application to multiple meeting types
- Comparative analysis using framework, other models of performance, and model of performance comparing paper vs. model-based AEC meetings

CONTRIBUTIONS
- Information-Action Perspective and Framework
  - Task taxonomy and coding scheme to analyze use of AEC project information
  - Application of production theory to production of project model in meeting context as a way to measure meeting productivity

INTUITION
- AEC Project meeting can be viewed as a process of tasks related to the project model (conceptual or virtual) and different information representations of the project model impact meeting performance.
- Analysis of conversation and information use can lead to understanding of interaction of specific information representations and AEC meeting tasks, relative value of those meeting tasks, and a method to assess meeting performance.

POD
- Conversation Analysis:
  - Language-Action, Speech-ACT, (Flores, Winograd, Eriss...): Basis for coding discourse but combine with information use coding
  - Task Taxonomies/Project Model Ontologies: Design Theory (G. Clayton, Fischer): Basis for validating task taxonomy and structure and extend beyond discussion
  - Meeting Performance/ Productivity: TFV Theory of Construction Production (Koskela)

Metrics:
- Time per task, resolution of tasks, type of task - “grounding” (understanding) vs. choosing, generating; time spent using an information artifact
- Scope: AEC project meetings and tasks related to AEC project model

OBSERVED PROBLEM
- #1: Meetings stink and information is inadequate.
- AEC project teams using paper-based information spent more time time “grounding” and understanding the project model, more time unfocused, and less time successful evaluating and proposing alternatives than teams using electronic, or model-based information.
- #2: No model of AEC meeting performance to quantifiably compare the impact of information representation.

PRACTICAL SIGNIFICANCE
- Method to compare information representations used in AEC meetings and produce guidelines or recommendations for information representations.
Where and When to Begin?

Do it early and often
Start with questions at every phase
Initial Literature Review: From Scratch

- Interest
- Curiosity

Lead to broad, general questions to frame initial review

- Meetings
- Groups
- Technologies

- Who is doing research around teams using technologies?
- Where is research going on?
- Approaches to group/technology research?
Initial Literature Review

• Find resources related to interest, topic:
  – Institutions, research groups
  – Journals
  – Conferences
  – Organizations
  – Key Researchers

• Meeting research
  – Arizona
  – CDR
  – Mostly “small groups”

• Journals
  – Small Group Research
  – Organization Science
  – Human Interaction

• Conferences
  – CSCW
  – Hawaii Conf. Information
Initial Literature Review

Useful guide for future research explorations
Identify potential gaps, areas unexplored

Domain research does not build on group or Man. Science and vice-versa

Research does not look at format, presentation of information and impact on group process
Exploratory Literature Review

- Topic
- Question
- Methods

Lead to Questions to frame exploratory review

- Use of information, artifacts
- Observe teams
- Analyze activities

- What examples of observation and analysis of teams exist? Metrics? Models?
- Do any look explicitly at use of information, artifacts?
- What research methods do they use?
- What frameworks exist to observe/analyze teams?
Exploratory Literature Review

• Identify topic areas
• Search, read, highlight
• Outline, summarize
• More questions

• Observation methods/Metrics:
  – Coding, Satisfaction Attainment

• Group tasks/models
  – Task Circumplex, IPO

• Theories
  – Language/Action, Speech Acts
  – Lean, Production Theory
  – Grounding
  – Information Theory

• What is Language/Action, applied to groups?
• What is performance? What is a good meeting?
• What is value-add?
• What is difference between task, acts, activities?
Explore: Outline, Structure

- Outline and take notes during POD
- Terminology, Acronyms
  - Relationships between?
  - Purpose?
  - Limitations?

- Theories, Models
  - Theories, Models
    - Relationships?
    - Purpose?
    - Limitations?
Explore: Take Notes, Outline, Start to Organize

- Outlines
- Notes
- Tables
- Include References!

(McGrath, 1984)

<table>
<thead>
<tr>
<th>Fundamental Theory</th>
<th>Leadership, Role assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task Organization (Major)</td>
<td></td>
</tr>
<tr>
<td>Generate Planning</td>
<td>Giving Information</td>
</tr>
<tr>
<td>- Creativity</td>
<td>Questioning/Seeking Information</td>
</tr>
<tr>
<td>Choose Intellecitive Decision-Making</td>
<td>Organizing Ideas</td>
</tr>
<tr>
<td>- Decision-Making</td>
<td>Clarifying Ideas</td>
</tr>
<tr>
<td>Negotiate Cognitive Conflict</td>
<td>Summarizing</td>
</tr>
<tr>
<td>- Mixed-Motive</td>
<td>Evaluating</td>
</tr>
<tr>
<td>Execute Contests/Battles</td>
<td>Deciding</td>
</tr>
<tr>
<td>- Performances</td>
<td></td>
</tr>
</tbody>
</table>

- 8 tasks
  a) Planning tasks (generating plans)
  b) Creativity tasks (generating ideas)
  c) Intellecitive tasks (solving problems with correct answers)
  d) Decision-making tasks (deciding issues with right answers)
  e) Cognitive conflict tasks (resolving conflicts of viewpoints)
  f) Mixed-motive tasks (resolving conflicts of interest)

- resoloving conflicts of power
- tasks (executing performance tasks)

- view of group decision, changes in pattern of
  - by looking at the task organization

- future
- 1 (getting job done) or social needs (tension, rivalry/antagonism)
Explore: Organizing Research

- Save papers, links
- Organize papers
As POD expands, continue to document areas and key findings, limitations

Areas of POD:
- Groupware/Meeting Research
  - Task Frameworks/Typologies
  - Task/Technology Fit
  - Task Complexity
  - Group Interaction Analysis
  - Coding Schemes
    - Conversational segments, utterances
- Information Visualization
- Information Complexity
- Value-Adding Work

Key Findings and Limitations:
- Only 2 studies found on group visualization
- GDSS work predominantly looks at:
  - Limited tasks and not fuzzy tasks
  - Technology attributes are facilitation, structure control oriented, mode of communication
  - Performance is function of task performance (time, quality)
  - Few look at complexity
- Do not look at how the make-up or dynamics of tasks are changed or relations between tasks->process
- Focus on finding a ‘fit’ for specific tasks, but meetings are multi-task, specifically at task level
- Good coding scheme examples, but few examples of applying task frameworks to coding of natural meetings since most evaluations look at “result” not “process”
- Typologies do not look at complexity as function of form of information or type of information, just quantity, etc.
Exploratory Literature Review

- Identify models to build on
- Identify gaps
- Identify categories relevant to research

Focus is on “tasks” as opposed to sets of task or overall process

Outcomes are typically “decision” focused

Nothing looking at interaction with information, artifacts
Focused Literature Review

- Map questions, proposed contributions to review
- Discuss scope of research in context of POD
- Organize, structure POD

- Research framework/model to POD
- Typology to POD
- Coding method and analysis to POD

- Why is my proposed framework different from existing? -> Compare
- What models am I building on and why? Which ones don’t apply?
- Are my methods and metrics proven, reliable?
Link POD to Contribution

- **Goal:** Observe and Code Meeting
- **Contribution:** Method to code information actions
- **Gap:**
- **Theories:**
- **POD Area:** Observational, Coding Methods
- **Characterize Information Use:**
  - **Start thinking:**
  - **Is this a contribution?**
  - **Am I addressing this gap?**
  - **Am I using this to guide methods or model?**
- **Value relative to Project:**
  - Relative value as a function of model optimization (iteration, evaluation)
  - Productivity is related to “permanent”, physical or task, decision specific
  - Value vs. Non-Value added, Contributory vs. Oglesby, Lean Meeting Research
  - Linguistics, Group Research, and Design/Construction Theory

Linguistics, Group Research, and Design/Construction Theory
Define work in context of POD

- Consider “scope” of research relative to POD and other research, may help to focus and refine POD

Where are gaps in POD?
Focus Literature Review

Consider best way to communicate POD

Table: Chart

Discuss key findings, limitations

- Define metrics or rationale for POD

<table>
<thead>
<tr>
<th>Activity</th>
<th>Design Framework</th>
<th>Planning Phase Artifact</th>
<th>Activity</th>
<th>Design Framework</th>
<th>State of Artifact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
<td>Activity</td>
<td>Class</td>
<td>Activity</td>
<td>Design Framework</td>
<td>State of Artifact</td>
</tr>
<tr>
<td>Class</td>
<td>Activity</td>
<td>Class</td>
<td>Activity</td>
<td>Design Framework</td>
<td>State of Artifact</td>
</tr>
<tr>
<td>Class</td>
<td>Activity</td>
<td>Class</td>
<td>Activity</td>
<td>Design Framework</td>
<td>State of Artifact</td>
</tr>
</tbody>
</table>

Key Findings
- Various studies, student groups, in lab and in field, found correlations between groups with overt agreement behavior and satisfaction
- Wide variation in decision paths, some teams exhibited unitary decision path, 50% non-unitary (Poole and Roth 1989)

Limitations
- Too many categories, and lacks consistency across the activities, difficult to interpret and apply
- Behavioral focus, does not capture or relate to “product” or target of action

Organizes categories into
Focused Review: Communicate

- Use charts to compare R&D and position research
Refined Literature Review

- Organize and document
- Contributory or Significant POD
  - Building on?
  - Influenced or framed research, but not contributing to
- Refer to literature for any “holes”

- POD for Group Models
- POD for Group Task Classification
  - General
  - Domain
- POD for Group Process/Outcome
  - Observation Methods
  - Coding processes
  - Inter-rater reliability
- POD for Artifact Interaction
  - Domain
  - General
Use a research model, framework to organize or summarize results of POD.
3.2 Group Research and Models of Team Interaction, Actions, and Team Effectiveness or Performance

Group researchers study the psychology, communication, and organizational behavior of groups. AEC project teams are a specific type of group and several group research case studies have observed architects and engineers, particularly in design activities (INSERT REF TO: ). The theories, models, and findings from group research are relevant to this research and specifically provide an initial framework to model the AEC meeting process, team activities, and sources for methods to analyze meeting outcome. The review was framed by the scope of this research relative to the overall field of group research (Figure 11) and the following parameters:

Present POD

• Rationale

1. Group research studying groups in meetings and discourse, not at the micro-level of utterances or individual interactions such as gestures and not at the macro-level of groups within an organization. The unit of analysis for the TAP framework are activities observed through discourse and bounded by the meeting.

2. Research that models groups as an input-process-output

Purpose of group analysis: Activities of group as a unit vs. studying individual activity and interaction. The focus is on the interaction of the team with the project artifacts. Emotional behaviors and non-verbal analysis is not emphasized.

Within the group research literature there are several groups that focus on the interaction of groups with technology or digital artifacts:

- Researchers developing Group Decision Support Systems (GDSS) within Management Information Science
- Computer Supported Cooperative Work (CSCW)
- Electronic Meeting Systems (EMS) (Nunamaker et al. 1991)
- Design Studies: Researchers look at process of design from a group perspective
Refined Literature Review

3.2 Group Research and Models of Team Interaction, Actions, and Team Effectiveness or Performance

Group researchers study the psychology, communication, and organizational behavior of groups. AEC project teams are a specific type of group and several group research case studies have observed architects and engineers, particularly in design activities (INSERT REF TO: ). The theories, models, and findings from group research are relevant to this research and specifically provide an initial framework to model the AEC meeting process, team activities, and sources for methods to analyze meeting outcome. The review was framed by the scope of this research relative to the overall field of group research (Figure 11) and the following parameters:

- **Rationale**

  - Research that models groups as an input-process-output
  - **Purpose of group analysis:** Activities of group as a unit vs. studying individual activity and interaction. The focus is on the interaction of the team with the project artifacts. Emotional behaviors and non-verbal analysis is not emphasized.
  - Within the group research literature there are several groups that focus on the interaction of groups with technology or digital artifacts:
    - Researchers developing Group Decision Support Systems (GDSS) within Management Information Science
    - Computer Supported Cooperative Work (CSCW)
    - Electronic Meeting Systems (EMS) (Nunamaker et al. 1991)
    - Design Studies: Researchers look at process of design from a group perspective
Focused Literature Review

Present POD
- Key Findings
- Analysis
- Limitations addressed in your research

Table 1. Significant research models and frameworks of group interaction and group process where corresponding coding schemes were developed and employed for analysis.

<table>
<thead>
<tr>
<th>Researchers</th>
<th>Perspective</th>
<th>Theory</th>
<th>Cited</th>
<th>Level of Analysis</th>
<th>Cross-Analysts?</th>
</tr>
</thead>
<tbody>
<tr>
<td>(McGrath 1984)</td>
<td>Functional</td>
<td>NEED TO REVIEW AGAIN</td>
<td>828</td>
<td>Discourse</td>
<td>Activities of group</td>
</tr>
<tr>
<td>(Hedman, 1987)</td>
<td>Activity</td>
<td>Coding scheme for describing what teams &quot;do&quot;</td>
<td>505</td>
<td>Socio-Emotional</td>
<td>Activities of group</td>
</tr>
<tr>
<td>(Hedman and Morris, 1975)</td>
<td></td>
<td>differentiated between tasks related to what</td>
<td></td>
<td>Semantic</td>
<td></td>
</tr>
<tr>
<td>(Bales, 1976; Originally, 1951)</td>
<td>Behavior</td>
<td>Interaction Process Analysis</td>
<td>652</td>
<td>Semantic</td>
<td></td>
</tr>
<tr>
<td>(DeSanctis and Galuppi, 1987)</td>
<td></td>
<td>Task Complexity: the tasks groups perform</td>
<td>614</td>
<td>Task, Discourse</td>
<td>Group Tasks</td>
</tr>
<tr>
<td>(Olson et al., 1992; Olson</td>
<td></td>
<td>Coding scheme for describing what teams &quot;do&quot;</td>
<td>378</td>
<td>1 minute intervals</td>
<td>Activities group</td>
</tr>
<tr>
<td>and Olson, 2000) **</td>
<td></td>
<td>differentiated between tasks related to what</td>
<td></td>
<td></td>
<td>is doing</td>
</tr>
<tr>
<td>(Purnam and Zigurs, 1981)</td>
<td>Influence</td>
<td>Procedural Message, Capture Attempts to Influence</td>
<td>91</td>
<td>Turn</td>
<td>Influence Actions</td>
</tr>
<tr>
<td>(McGrath, 1991)</td>
<td></td>
<td>Group Interaction/Performance</td>
<td>247</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Fisher, 1977)</td>
<td></td>
<td>Categories of Verbal Interaction</td>
<td>60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Rogers and Force, 1975)</td>
<td></td>
<td>Transactional view of messages, void of content</td>
<td>47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Poole and Roth, 1989)</td>
<td></td>
<td>DECS</td>
<td>84</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Methods for Literature Review

- Creativity
- Diligence
- Inquisitiveness
- Patience…and knowing when to stop 😊
- Google is your friend..
Practical Tips: Getting Started

• Setup research folder
  – Create sub-folders for topic areas

• Develop a consistent naming scheme for papers:
  – Paper title
  – Author-Year
  – Author-Title
  – Endnote number
Software Tools

- Software tools:
  - EndNote
  - Microsoft Word
  - Mind Map software
  - Adobe Acrobat
  - Web Browser

- Why Endnote?
  - Stores all references
  - Can adjust format styles per journal, conference, or other publication requirements
  - Add links to papers for better management
  - Add keywords, notes for searching and organizing literature review
# Online Search

<table>
<thead>
<tr>
<th>Web Site</th>
<th>Good for…</th>
<th>Not…</th>
</tr>
</thead>
<tbody>
<tr>
<td>google.scholar.com</td>
<td>Quickly highlighting popular and seminal research</td>
<td>Older papers are only found once you know the author, title</td>
</tr>
<tr>
<td></td>
<td>Lists # of citations – good indicator of importance of paper</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.google.com">www.google.com</a></td>
<td>Comprehensive search across websites</td>
<td>Online resources publicly available</td>
</tr>
<tr>
<td><a href="http://sulair.stanford.edu">http://sulair.stanford.edu</a></td>
<td>Finding specific reference by author or book title—especially books</td>
<td>General search</td>
</tr>
<tr>
<td></td>
<td>Finding a journal</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.dictionary.com">www.dictionary.com</a></td>
<td>Great for citing definitions or clarifying common terms</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.wikipedia.com">www.wikipedia.com</a></td>
<td>Excellent source for general description of theories, models, terms with references to other sources</td>
<td>Referencable material</td>
</tr>
<tr>
<td><a href="http://www11.tdnet.com/francs.asp">http://www11.tdnet.com/francs.asp</a> (Socrates Electronic Journals)</td>
<td>Finding a journal online site</td>
<td></td>
</tr>
<tr>
<td><a href="http://citeseer.ist.psu.edu">http://citeseer.ist.psu.edu</a></td>
<td>Finding references by authors</td>
<td>Does not cover all domains</td>
</tr>
<tr>
<td><a href="http://search.epnet.com">http://search.epnet.com</a></td>
<td>If you know general database you want to look in</td>
<td>General, intro research</td>
</tr>
<tr>
<td><a href="http://www.census.gov/compendia/statab">www.census.gov/compendia/statab</a></td>
<td>Statistics of U.S.</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.questia.com">www.questia.com</a></td>
<td>Online books in areas of sociology, education, group research</td>
<td>Engineering in general</td>
</tr>
<tr>
<td></td>
<td>Great tools to bookmark, highlight, and cite books</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.lii.org">www.lii.org</a></td>
<td>Librarian’s internet index</td>
<td></td>
</tr>
<tr>
<td><a href="http://del.icio.us">http://del.icio.us</a></td>
<td>Grass-roots bookmarking</td>
<td></td>
</tr>
</tbody>
</table>
Practical Tips: Online Search

- General search sites
- AEC specific
- Magazines, Commercial Sites
Practical Tips: Documenting References

- Start with outline
  - Insert notes, references within outline and expand as needed
- Use tables to structure notes
  - Select criteria, ideas
- References end of papers are best source for more information
- Go to specific university or institution web sites. Many papers and reports can be found at specific schools.
- Go to researcher’s home page. I’ve found old, out-dated papers not available online through some academics.
- Email the researcher. I’ve also emailed the researcher and one fedexed a hard-copy of the paper.
Practical Tips: Miscellaneous

• Stanford’s SU LAIR has a great intro page for sources for hard to find documents: http://sulair.stanford.edu/research_help/how_find/index.html

• PhD Thesis, working papers, reports.
  – There is a searchable thesis database found through the Stanford site. My experience is it’s best to go the university and department site or email the researcher directly

• Using PDF:
  – You can highlight, add bookmarks, search. Get to learn Adobe Acrobat – very useful tool