Group Concept Mapping for Program Planning, Action Management and Evaluation

September 25, 2013
Prepared for the Centers for Disease Control and Prevention

Concept Systems, Inc.
Ithaca, NY
Today’s Talk

- What is Group Concept Mapping?
- How do we do it?
- What do the results of a group concept map look like?
- What are some useful examples in planning and evaluation?
- How is the analysis conducted?
- What are some other ways that Group Concept Mapping can support an organization’s efficient and effective planning and evaluation?
- What other research tools can we link to GCM to get even richer results and utility?
Today’s Talk

- We hope that there are questions and comments!
- We will stop periodically and ask.
- You may also enter your questions from your screen; we will answer each time we stop.
- We look forward to final questions and discussion at the end.
Thank you for inviting me

• President of Concept Systems, Inc., a woman-owned planning, research, and evaluation firm based in Ithaca, NY
• Specializing in co-authored (group) design for program planning, implementation and evaluation
• Some clients:
  CDC, NACDD
  NIH: OBSSR, NCI, NIAID
  DHHS: OWH, SAMHSA, CMS
• Philosophy: supporting those who work to improve current conditions that affect our nation’s wellbeing, by developing and applying rigorous, reliable and relevant research tools and results
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Group Concept Mapping: A Definition

“Concept Mapping is a methodology that creates a stakeholder-authored visual geography of ideas from many communities of interest, combined with specific analysis and data interpretation methods, to produce maps that can then be used to guide planning and evaluation efforts on the issues that matter to the group.”
Kane & Trochim, 2007.

“Group Concept Mapping is uniquely distinguished from processes generally labeled concept mapping, by virtue of two key attributes: active engagement of individuals and emergent rather than hierarchical structure.”
Kane, 2013
Group Concept Mapping as Participatory Inquiry* 

• Actively seeks and captures the opinions, knowledge and articulations of need of “community” members
• Simple rules and processes encourage knowledge contribution at each step
• Visual outputs provide simple high-level representations of the community’s co-authored framework
• Leadership, partners and community can align to agree on implementation and evaluation priorities; a purposeful partnership.


Group Concept Mapping as a Systems Inquiry*

• Inductive and generative; allows shared meaning to emerge
• Simple rules and clear analyses generate complex patterns or results
• Visual outputs show interpretable and defensible representations of evolving thinking
• Products support autonomous agents aligning action with broader organizational or systems objectives; a default partnership.

Process to Output

• Group concept mapping
  – integrates and describes multiple perspectives at different levels
  – articulates emerging constructs from the details captured from individuals
  – supports acceptance and use of the resulting framework

Knowledgeable Individual

Many Individuals

Group or Community

Emerging Constructs

Specific Idea

Conceptual Framework
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Simple Rules for Conducting Group Concept Mapping

**Planning:** Planners and key issue advisors develop a *focus prompt* and *identify participants*

**Idea Generation:** Communities of interest and expertise are identified, and respond with *brainstormed ideas*

**Structuring:** Communities of interest and expertise *sort and rate* the results of the idea development, authoring the structure and value domain of the issue.

**Analysis:** Construct databases, produce results and compare analysis results options.

**Representation:** Compute the *maps, pattern matches and “go zones,”* and prepare them for interpretation by communities of interest.

**Interpretation and Use:** *Strategies and tactics for action* follow directly from the *interpretation* of the results. Pattern matches and go zones help build consensus on action.
Example:

Developing a Conceptual Framework for an Evaluation System for the NIAID HIV/AIDS Clinical Trial Networks

Kagan et al., 2009
Some Background

- Restructuring networks
- Recompeting areas of research
- Integrating critical cross network efforts
- Clinical sites together
Define the Issue To Be Addressed

Specific Aims:
- Identify the goals of a large, complex research initiative across a wide array of stakeholders
- Develop a comprehensive conceptual model to guide the evaluation of outcomes of collaborative work

Focus Prompt:
“Coordinated clinical research networks will be successful if…”

Work cited here is published in Kagan et al., 2009.
Identify the Key Informants

Planning

• DAIDS staff
• Network investigators and leadership
• the HIV/AIDS Office of Network Coordination
• network evaluation coordinators
• community advisory board representatives
• other government agency staff with a role in the networks
Elicit Knowledge and Opinion

Idea Generation

- Standardize key laboratory procedures across the networks. (1)
- There is integrated use of domestic and international sites. (21)
- There are standardized tool kits for use in behavioral studies. (26)
- Ethics, community and behavioral teams provide input early in protocol development. (77)
- Clinical trial sites successfully meet recruitment and retention goals. (84)
Organize Knowledge & Opinion

Structuring

Sort the Ideas

Rate the Ideas
- Importance
Build the Conceptual Framework

Analysis and Representation
Turn Data into Meaning

Interpretation & Use
Building the Concept Map

• The Raw Materials:
  – Statements
  – Sort Input from each participant

• The Tools
  – Aggregation of Sort Data
  – Similarity Matrix
  – Multidimensional Scaling
  – Cluster analysis
  – Anchoring/Bridging Analysis
This point map shows all the elements in relation to one another.
Similar Ideas Are Closer; Less Related Content is More Distant

Ethics, community and behavioral teams provide input early in protocol development. (77)

Substudies add value to the experimental design of the parent protocols (73)

Networks provide high quality, scientifically valid results (82)

Networks assess research issues and questions in the context of prevention and treatment policies. (37)

Standardized systems of accountability are integrated across networks and DAIDS. (43)

“Coordinated clinical research networks will be successful if...”
Ideas are Organized into Groups

...so that many concepts can be considered in a shared structure
...contains all the details and provides a conceptual framework.
networks obtain scientific input and involve a large group of clinical investigators in the research agenda. (4)

networks develop protocols with attainable goals. (7)

there is collaboration with experts outside the networks. (11)

there is communication and cooperation between stakeholders in the planning of science. (16)

there is acknowledgement of and support for the scientific contributions of international research partners. (19)

networks integrate biomedical and technological advances with behavioral intervention strategies. (57)

networks focus on complementary pieces of the research agenda. (62)

networks reassess and reprioritize their scientific priorities as the field evolves. (63)

networks focus on high priority trials that will not be done in the private sector. (64)

the proposed scientific priorities and research plan is feasible. (78)
Cluster: Community Engagement

“Coordinated clinical research networks will be successful if...”

- Appropriate and relevant community representation is included at all levels: institute, network, and site. (31)
- Consideration is given to the differences in conditions in resource poor nations. (39)
- The dignity and human rights of participants are respected. (42)
- Sites have the scientific and technical skills needed to pursue the research agenda. (52)
- The community is included in every stage of a protocol. (68)
- Research is conducted acknowledging the culture, norms and values of the community they are working with. (74)
- Ethics, community and behavioral teams provide input early in protocol development. (77)
- Research sites provide hours to make participation accessible to subjects. (80)
- Community support, training and education are provided. (83)
- Clinical trial sites successfully meet recruitment and retention goals. (84)
Cluster: Operations and Management

“Coordinated clinical research networks will be successful if...”

DAIDS has methods for managing complex endeavors. (8)
the standard operating procedures across each of the networks are consistent. (10)
there is a performance-oriented network culture. (14)
DAIDS medical officers/ program officers provide a consistent level of input/oversight to all networks. (18)
there is a streamlined protocol development and implementation process. (24)
there are uniform standards for site development. (34)
each component of the network (committees, SDMC, labs, ops centers, sites) has the authority to perform its duties and responsibilities without the interference of the others. (35)
a central IRB system is established. (38)
efficient and reasonable regulatory processing can be established. (40)
standardized systems of accountability are integrated across networks and DAIDS. (43)
protocols are closed out, analyzed and published in a timely manner. (48)
clear direction is given on which DAIDS priorities are within the scope of the networks versus which DAIDS priorities should be achieved via other grant mechanisms. (66)
DAIDS staff who work with the studies have a voice in decisions to approve proposals/ protocols. (70)

DAIDS provides clear, consistent messages about goals, objectives and expectations. (81)
there is a defined process for networks to use in reviewing future site expansion. (91)
Rating

Relative Importance
1 = relatively unimportant
2 = somewhat important
3 = moderately important
4 = very important
5 = extremely important

Respondents

Self identified by
• Network
• Role
• Scientific Focus
Values of All Participants

Cluster Legend

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<th>Value</th>
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<td>4.05 to 4.11*</td>
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*significantly different from * at .05 level
Importance Ratings by Area of Science

All Participants
N= 308

Vaccine Research and Development
N= 53

Translational Research and Drug Development
N= 38

Optimization of Clinical Mgmt
N= 112

Microbicides
N= 17

Prevention of Mother to Child Transmission
N= 23

Prevention of HIV Infection
N= 23

Biomedical Objectives
Relevance to Participants
Scientific Agenda
Setting
Community Involvement
Resource Utilization
DAIDS Policies and Procedures
Collaboration, Communication, Harmonization
Operations and Management

r = .92
r = .63
r = .9
r = .83
r = .77
r = .78

r = 4.35
r = 3.64
Go-Zone: Looking Within a Cluster

- **Higher importance for Group A, Lower importance from Group B**
- **Items perceived by both groups as relatively less important**
- **Items perceived by both groups as relatively more important**

- Importance mean for participant group A
- Importance mean for participant group B
DAIDS has methods for managing complex endeavors. (8)
DAIDS medical officers/ program officers provide a consistent level of input/oversight to all networks. (18)
DAIDS staff who work with the studies have a voice in decisions to approve proposals/ protocols. (70)

DAIDS develops a clear policy that facilitates generic drug use. (6)

Clear direction is given on which DAIDS priorities are within the scope of the networks versus which DAIDS priorities should be achieved via other grant mechanisms. (66)

DAIDS policies reflect what is required for good science, protection of human subjects, and safety. (72)

DAIDS provides clear, consistent messages about goals, objectives and expectations. (81)

NIAID’s budgeting process for the networks and the sites is transparent. (25)
NIAID considers multiple factors in funding networks and sites. (44)

DAIDS streamlines their monitoring/ auditing procedures. (88)
Turning Meaning into Action: Evaluation Logic Model

- Clusters as inputs, activities, outputs and outcomes for logic model development
Using the Framework:
Segmentation and Integration

• Clusters as **inputs**, **activities**, **outputs** and **outcomes** for logic model development and evaluation foci.
• Emergent structure as the basis for **4 domains**, upon which more sophisticated evaluation projects were developed.
• At conclusion of 3 year evaluation project, concept map continues to highlight **relationships among evaluation foci** unforeseen by the evaluation team at the start of the project.
• Publications considered **significant contributions** to the field.
Using the Framework: Publications


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How We Conduct Analysis: Simple Rules

Enter
- Individual Sort Data → Similarity Matrix

Conduct
- Multidimensional Scaling → Point Map
- Hierarchical Cluster Analysis → Cluster Map
Similarity Matrix

- Contains unique data on the relationship of each idea to each *other idea*—for *every* individual who took part in sorting.

- Completed binary square similarity matrix reflects the *sum* of relationship of each statement to all others.
# Similarity Matrix

![Sorters](image)

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<td>1</td>
<td>1</td>
<td>0</td>
<td>3</td>
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</table>
Similarity Matrix

Start with total square similarity matrix: data from five participants

To simplify the example, we'll look at items 1-4 only...

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Start with total square similarity matrix: data from five participants
Similarity Matrix

Start with total square similarity matrix

<table>
<thead>
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Coordinate Matrix

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<td>3.2</td>
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<td>3.2</td>
</tr>
<tr>
<td>4</td>
<td>1.9</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Convert similarity matrix to distances between points—placing points in two dimensions, like distances between cities

We can show these as a matrix of distances between points

<table>
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<tr>
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<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<td>4</td>
<td>1.1</td>
<td>4.6</td>
<td>2.1</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Conversion of similarity to distances on the map among all points; correspondence is stress value
Multidimensional Scaling

• Similarity Matrix = degree of relationship

• Table of Distances = calculated using similarity

• Placement in relation to each other item, based on table of distances

• Stress: relationship between similarity input and distances on the map

• Low stress = greater correspondence between similarity input and map
Multidimensional Scaling

• Directionality
  – Does MDS know North from South?

• Dimensionality
  – Why only two dimensions?

• Stress
  – What does it indicate re strength of analysis?
  – Benchmarking guidance
Cluster Analysis

- Hierarchical
  - clusters get built in a tree-like method

- Agglomerative
  - builds toward all items in one pile (vs. divisive - all start in one and divide)

- Clustering criterion
  - Ward’s algorithm to dictate merger procedure
Cluster Analysis

<table>
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<tr>
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<td>3</td>
<td>9 + 10</td>
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<tr>
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<td>(1 + 6) + 8</td>
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Cluster Analysis

<table>
<thead>
<tr>
<th>Merge</th>
<th>Points Merged</th>
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<td>6</td>
<td>2 + (9 + 10)</td>
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<td>7</td>
<td>((1 + 6) + 8) + (3 + 4)</td>
</tr>
<tr>
<td>8</td>
<td>(5 + 7) + ((2 + (9 + 10))</td>
</tr>
<tr>
<td>9</td>
<td>(((1 + 6) + 8) + (3 + 4)) + (5 + 7) + ((2 + (9 + 10))</td>
</tr>
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</table>

Number of Clusters
Additional Analyses

• Anchoring/Bridging:
  – Lower bridging items are considered *anchors*; help clarify meaning of a specific area of map
  – Higher bridging values connects, or bridges areas on map

• Spanning Analysis: visualization of anchoring/bridging

• Cluster Label:
  – not content analysis—quantitative analysis of best “fitting” suggested cluster names from participants
An Anchor

Advertise the organization’s image rather than just specific programs (1)

Bridging value = .06 (low)
Expand the number of program facilities by 25% in next five years (49)

Bridging value = .97 (high)
Integrated Analysis Methodology

- **SPSS**
  - Enter sort data
  - Compute similarity matrix
  - Run MDS
  - Run Cluster Analysis (on MDS coordinates)
  - Select number of clusters
  - Plot maps
  - Produce rating statistics
  - Produce rating maps
  - Produce pattern matches (in Excel)
  - Produce bivariate plots
  - Post-process plots in graphics program
  - Produce reports

- **Concept System**
  - Select sorts
  - Run analysis
  - Select number of clusters
  - Produce maps, pattern matches and go-zones
  - Produce reports
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An Example: Policy and Practice

Healthy Aging Mobility Action Plan
CDC Division of Adult and Community Health
and
National Association of Chronic Disease Directors
Defining the Issue

To engage stakeholders and identify strategies that will contribute to promoting mobility in community-dwelling older adults as a coordinated response across agencies and organizations.

“One specific action that can lead to positive change in mobility for older adults in the U.S. is...”

• N>200:
  • Architecture and Engineering
  • Aging
  • City Planning, and Urban Planning
  • Community Development
  • Disability programs/research
  • Family and Community Health
  • Geriatric Medicine
  • Gerontology
  • Public Health
  • Social Work and Psychology
  • Rehabilitation, Physical, and Occupational Therapy
  • Transportation
Eliciting Knowledge and Opinion

• Online brainstorming session: April 23, - May 11, 2012 (174 website visits)

6. focus research on a comprehensive definition of optimal mobility and link to outcomes such as quality of life.

20. identify one or more communities to serve as environmental models or as examples of mobility-sensitive or friendly communities.

69. promote training to help older adults and people with disabilities to overcome community barriers to participation.

80. identify and evaluate state-wide standards for hazard-free, safe and accessible public areas.

90. provide coverage for Community Health Workers to provide support and transportation.

94. support the placement of food access points (like corner stores or mobile farmer's markets) and connect locations to walking and wheeling trails, to support destination walking and riding.
Content and Structuring

302 statements generated
102 final

Sort 102 Ideas

Rate the Ideas
• Potential Impact
• Feasibility
14. include requirements to ensure that publically-funded agencies responsible for providing transportation also participate in the local mobility planning process.

29. require coordination and integration among local, county, regional, and state entities responsible for pedestrian, cycling, and transit to ensure planning and use of best practices.

30. create state-specific guidance for Complete Streets to encourage planning and transportation funding reallocation for a range of transportation modes.

43. form coalitions of community groups with mutual interests, to develop and help adopt complete street policies that include road, sidewalk, lighting and shade polices and other supports to encourage walking while providing a safe and healthy area.
25. Implement strategies known to make street crossings safer for crossing assistance.

56. Implement complete streets, traffic calming, and continuous sidewalks to promote safer, more functional and more aesthetically pleasing walking and wheeling environments.

63. Increase use of pedestrian-friendly walkways in all areas with expanded use of crosswalks and extended traffic lights to assure safety.
Targeting Priorities with Delphi

- State chronic disease directors provided input on priority actions for states
- Target: 5-6 highest potential actions for implementation
- Multiple iterations to determine consensus
- Process began with 20 high potential impact/high achievability items from concept map
- Two forms of prioritization: ratings and ranking
  - Round 1: 20 actions rated by 39/43 respondents
  - Round 2: 15 remaining actions rated by 35/43 respondents
  - Round 3: 7 remaining actions ranked by 40/43 respondents
**Final Delphi Results**

- 4 top priorities based on level of agreement across rounds and methods
  - 70: Support and implement training for city planning and public health government staff, on model legislation, projects and programs to enact and maintain Complete Streets plans
  - 56: Implement complete streets, traffic calming, and continuous sidewalks to promote safer, more functional and more aesthetically pleasing walking and wheeling environments
  - 29: Require coordination and integration among local, county, regional, and state entities responsible for pedestrian, cycling, and transit to ensure planning and use of best practices
  - 11: Include mobility in coordinated chronic disease prevention and health promotion state plans

![Item Agreement Graph]

<table>
<thead>
<tr>
<th>Item number</th>
<th>Round 1</th>
<th>Round 2</th>
<th>Round 3</th>
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# Extending GCM’s Capacity: Link other Methods

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<th>Method</th>
<th>Broaden, Support Framework</th>
<th>Plan and Implement</th>
<th>Evaluate</th>
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Learning More About Group Concept Mapping

- Group concept mapping publications database
  - Basic methodology bibliography
  - AND special topic bibliographies: e.g., 112 Health, Public Health and Health Care-based publications in 89 journals covering about 22 subjects.

Topics include
  - Alzheimers/brain
  - Cancer prevention/treatment
  - Community engagement
  - Elder care
  - End of life
  - Women’s health
  - Prevention research
  - Tobacco control

Some applications
  - Action Planning
  - Evaluation
  - Needs assessment
  - Organizational development
  - Partnership development
  - Program development
  - Conceptual framework/theory development

- Other publication databases available for researchers and program professionals
- Methodology FAQs
- GCM Training Program
Questions, Discussion

Thank you!

mkane@conceptsystems.com