Combinatorial Inquiries into Knowledge Federation

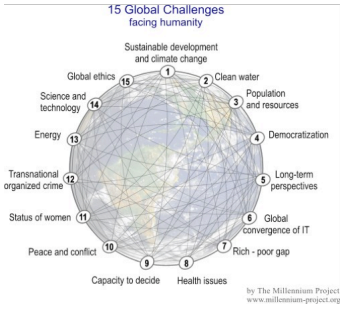
This paper itself proposes a combinatorial inquiry, to explore how combination theory can be leveraged to integrate knowledge federation with the co-operative inquiry method. For this inquiry, knowledge federation is initially defined as the real-time joining together of disparate knowledge sources for the task-at-hand, with each source retaining its independence. Although each source may subsequently be influenced by federation, this happens through mutual agreements from within the source. There are several contexts for sources: people as individuals and communities; problem-spaces as N-node systems; and knowledge repositories. This inquiry focuses on people, as it is people who identify and make sense of problem-spaces and interpret the content of knowledge repositories.

Each of these contexts can be profoundly informed by the principles of co-operative inquiry, as developed by John Heron and Peter Reason. The core principle of co-operative inquiry is that research is conducted 'with people' rather than 'on people'. This research is conducted in a cycle alternating between reflection and action: each person is co-subject in the action phases and co-researcher in the reflective phases. Combinatorial methods of reduction and reconstruction can enable a structured approach to developing a robust understanding of the subject of a co-operative inquiry.

Combinatorial Inquiry: The Theory

Combinatorial Inquiry is an open framework which enables the foundational co-operative inquiry method to be conducted in a scalable manner, and will evolve to integrate other personal and organizational development methods. By minimizing overlap among collaborative groups, it maximizes the potential for equity of influence among the group, providing a construct for systematically exploring group dynamics.

When modeling a system as a fully connected N-node network, the traditional reductionist approach focuses on the nodes as the base unit of consideration (this Global Challenges diagram shows a fully connected 15-node network). While any system must have the nodes defined, the combinatorial approach presented here complements this reduction process at two levels: reduction and reconstruction. The distinction made here is that combinatorial reduction makes the base unit for study a pair of nodes and the line connecting them, representing the one:one relationship between them, with this base unit referred to as a component-pair. Combinatorial reconstruction then builds upon these relationships by identifying subsystems where component-pairs are represented once and only once among all of the subsystems, and each subsystem has each node represented once and only once. This allows each subsystem to represent a perspective of the whole system, collectively informing a more robust understanding.



In essence, combinatorial inquiry provides the means for organizing and integrating co-operative inquiries. The initial reflection phase is comprised of the entire group as it forms and collectively defines the inquiry. In the first action phase, the group works in pairs, to further co-develop their initial understanding and co-determine their course of action, through direct dialogue with one other person (component-pairs of people). This informs the second action phase, in which each individual fully engages in the inquiry. At an appropriate interval specified by the group in phase 1, the pairs meet to converse about their reflections on their course of action, as preparation for meeting as the whole group. The whole group gathers to share their experiences, their courses of action, and reconsider the inquiry. Subsequent cycles are structured by combinatorial reconstruction, enabling each component-pair to be newly formed at each cycle, until each person has paired with all of the other members of the group, once and only once. This construct is shown in the table below for a system of four components, where rows represent subsystems.

On the surface level, the principles of co-operative inquiry and combinatorial reduction/reconstruction imply a paradox, as they are both intended to foster self-organization, yet seem to be imposing an orthodox set of behaviors and overly prescriptive assignments to groups, respectively. However, at a deeper level, the more adherent a group is to the principles, the greater the opportunities for freedom and self-organizing. As desired, the combinatorial methods can provide the full spectrum: from self-organizing the reconstruction among component-pairs to combinatorial reconstruction enabling a rigorous scientific process generating mutually independent perspectives of the whole system.

Karl Hebenstreit, Jr.
Resolving4change@gmail.com

Combinatorial Inquiry, integrated with the other contexts for knowledge federation, can then collectively provide a means for augmenting the inquiry group. Problem-spaces such as the Global Challenges provide a context for each inquiry, and federated knowledge repositories can capture the artifacts of each individual, pair, and group sensemaking effort in context.

Applying Combinatorial Inquiry: A Workshop Scenario

At a most immediate level, combinatorial inquiry can be the basis for designing workshops and even entire conferences. The scope and depth would depend on the time available, with the following scenario describing an extremely compressed variation.

The workshop begins with an introductory session, where the group co-defines a topic. There would then be three cycles of inquiry: generating ideas; identifying actions; and determining next actions. The group would be split into four subgroups (two pairs of two subgroups).

For the first round, each subgroup generates ideas. The paired subgroups would review each other's ideas and vote. The entire group would then converse, so that they could explain each other's ideas, and vote a second time.

The process would continue for rounds two and three, resulting in each subgroup working with each of the other subgroups, while identifying actions and then determining next actions. These next actions could be those already identified in round two, or may be composite actions integrating those actions.

Combinatorial Inquiry (Compressed Workshop)
Generating Ideas (AB ⁞ CD)
Identifying Actions (AC ⁞ BD)
Determining Next Actions (AD ⁞BC)

All of these votes can become the basis for one or more online forums, which can then be opened for public participation as appropriate.

STEM Journalism Inquiry

Online forums can also enable the opposite approach: crowdsourcing topics of inquiry, which can then generate numerous workshops. These workshops can then generate separate forums, or results can be added back to the originating online forum.

The candidate inquiry for exploring the potential of this online-to-workshops approach is Science, Technology, Engineering, and Mathematics (STEM) Journalism. As groundwork for potential doctoral research, categories of Learning (Education), Public Policy, and Organization Development have been added to the companion online forum established for this paper. Additional categories can be created upon request.

The combinatorial inquiry method can then be applied as a framework for integrating several topics that get accepted, based on a threshold level of votes from the community. While this STEM Journalism inquiry is being developed as an emergent topic, other inquiries could develop a systemic view of multiple established topics.

The challenge for our Knowledge Federation community will be how these multiple forums can be federated.

Karl Hebenstreit, Jr.
Resolving4change@gmail.com