

USING TEAM KNOWLEDGE ELICITATION AND CONCEPT MAPPING TO ENHANCE ORGANIZATIONAL EFFECTIVENESS FOR A PUBLIC HEALTH AGENCY

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Abstract: This article contains a description of a knowledge elicitation project with a team of public health professionals who work for a county public health agency in the United States. The purpose of the project was to increase organizational effectiveness by sharing the knowledge and insights of experienced public health nurses and environmental health staff throughout the agency. Of particular interest to the agency director were enhancing the focus on core public health principles and reducing the staff time and resources needed to bring new employees on board. The introduction contains a brief overview of the situation of public health organizations in the United States, the concept of effectiveness in a knowledge-based organization and a brief overview of literature on previous team knowledge elicitation efforts. The remainder of the paper discusses the situation of the agency, the conduct of the sessions, the knowledge model, and the impact of the project.

1 Introduction

The executives and staff of public health agencies in the United States typically face work demands that outstrip the agency's available capacity. In most cases, the work for which the agencies are responsible is mandated by law, so that reducing the work load by omitting some work is usually not an option. The nature of the work itself – dealing with the public in what can be highly-emotionally charged situations is stressful and the stress can work against effectiveness. The loss of capacity that results when staff members resign, retire or even when they are absent for vacation creates additional burdens, as does the necessary commitment of staff time and resources required to bring a new person on-board. The result is a decrease in overall effectiveness of the organization, and an increase in stress for the staff. Effective prioritization and decision-making thus are essential as ways to enable public health agencies to fulfill their purpose and to make the stress that staff experience manageable.

Existing methods to address these issues include staff training, monthly meetings of agency staff, and team meetings. While these are essential, they typically address operational and tactical issues, and are not designed to create the kind of clarifying “map of what matters” that a suite of concept maps, or visual knowledge model, can provide. The effectiveness of concept maps and visual knowledge models created using CmapTools lies in their ability to clarify conceptual hierarchy, key inter-relationships and inter-dependencies and their use as performance support and decision-support tools.

This article describes a knowledge elicitation and concept mapping project that took place on site in the offices of a public health agency. The staff are specialists in a broad range of community health and environmental health functions including: maternal and child health, epidemiology, water quality, septic system compliance, watershed health, storm water management and solid waste education. A total of eleven (11) knowledge elicitation sessions were conducted with groups of different sizes: four (4) sessions with groups of 7-11 participants, four (4) small group sessions – with 3-4 participants to develop a major sub-concept map for environmental health, and three (3) sessions with the agency director. The purpose was to increase effectiveness by clarifying the core knowledge and capabilities needed for a public health organization to protect and improve public health and enhancing a shared vision and common set of working principles.

The following sections describe relevant literature, characteristics of the public health agency and its staff, the knowledge elicitation sessions, the knowledge model and staff evaluation and project impact.

2. Relevant Theory and Literature

The following brief literature review addresses some of the prior work that had an impact on how this project was conceptualized and conducted.

2.1 Effectiveness of Knowledge Workers

Peter Drucker, the father of modern management theory and creator of the term “knowledge worker” argued that “the job of a knowledge worker is to be effective” (Drucker 1969). Effectiveness, he explains is doing the right things, in distinction to doing things right - the goal of efficiency. “It is far more important to do the

right things than to do things right.” (Drucker, 1969) Effectiveness is what turns knowledge, imagination, vision, purpose and resources into results. An effective organization is one that is doing what it set out to do and is achieving desired results for its customers or clients.

To be effective, a knowledge worker, requires a clear focus on the organization’s purpose and on “what matters.” The people working in the organization need a commonly shared understanding of what success really looks like. Executives and managers foster effectiveness by clarifying the organization’s purpose and helping people who work in the organization focus on what matters, i.e., on what are the right things to do. A characteristic of effective executives is that they make good use of people’s strengths and provide help and support to address weaknesses or gaps in capacity.

This requires promoting a shared perspective of the goals and purpose of the organization and to foster alignment of the work and the contributions individuals and teams make to help achieve the purpose and goals of the organization. In the Effective Executive, one of the key characteristics of executive effectiveness that Drucker outlines is “making decisions at the highest level of conceptualization.” Because they provide a coherent, concise view of the whole context, and because their hierarchical organization and the high-degree of conceptual clarity created by their propositional building blocks, concept mapping is a tool ideally suited to both foster staff and executive effectiveness.

Public health executives and staff are knowledge workers. Community health nurses work with epidemiological and survey data on the one hand, and on the other hand have extensive knowledge and skills in relationship-building and the capacity to respond to emergencies and challenging interpersonal situations with poise and tact. Environmental health staff have deep knowledge in water quality, local and State codes for septic systems, watershed management, and solid waste disposal. They too are required to deal with challenging and situations with citizens as a regular part of their work. As do community health nurses, they need exceptional “people skills” in handling emotionally charged situations and difficult people.

In this project, Drucker’s notion of effectiveness was a guiding principle for the work. In the public health agency discussed in this paper, organizational effectiveness requires staff in both community health and environmental health use core high-level public health concepts as guiding principles in daily work, as the basis for decision-making, prioritization and conduct of their work.

2.2 Team Knowledge Elicitation and Concept Mapping

The value of team knowledge elicitation as a tool for enhancing the effectiveness of teams was first described by Novak (1998) in the context of his work with product development teams at a consumer products company. “...in seminars with research directors at a very large consumer products company we used concept maps...to help groups design new products and to pinpoint gaps in knowledge available that needed to be filled through new, targeted research. The manager of the program remarked, ‘You led the team to see better the nature of the new product and research that needs to be done in four hours than usually occurs in four months.’ “

In addition, Novak has reported the response of a member of one of these cross-functional development teams: “The woman from Bleach said she felt she had a better idea of what the group was trying to do after working with cmaps for two weeks than she did with the Hair Care group after a year.” (Novak, 2004)

Bowen and Meyer (2008) describe the use of a “skeleton expert map” (Novak, 2004) to foster strategic alignment and build capacity with a distributed team of K-12 teachers and administrators involved in a project to improve teacher induction. Perez and Bowen (2008) describe the use of concept maps in the context of a national environmental monitoring project to provide a conceptual framework for eliciting stakeholder feedback on, and input to, the plan.

While the knowledge elicitation process and concept map construction for individual and team knowledge elicitation sessions are guided by the same principles, because individual team members bring different mental models, assumptions, points of view and even vocabulary, team knowledge elicitation can be both more challenging and more rewarding than knowledge elicitation with an individual expert. In team knowledge

elicitation, the knowledge is highly-emergent and is being simultaneously elicited and constructed. Clarifying the concepts themselves, the conceptual hierarchy and conceptual relationships can be a more extensive process for a team than for an individual expert. Sometimes the concept map undergoes extensive revision from one session to the next as the participants gain clarity and re-structure their own individual and group mental models. The process itself promotes alignment and effectiveness by fostering the construction of a common “mental model.”

3. The Jefferson County Public Health Knowledge Elicitation Project

3.1 The Agency

The public health agency featured in this article is divided into two divisions - community health and environmental health. Due to the long-standing history of community health in the United States, community health nurses share a common grounding in community health principles and concepts, e.g., prevention and the value of building and maintaining relationships – with clients and with colleagues. Because the background and training of environmental health staff are more varied, these principles and values do not typically occupy the same core status within their daily work life.

A large portion of the work of a key environmental health team at the agency consists of responding to citizen complaints about possible threats to public health such as failing septic systems, absence of septic systems and garbage. When the project started, there was no common set of principles to assist in prioritizing these complaints. This made it difficult to have consistency in decision-making and a quality control process.

The current culture of the public health agency is rich with knowledge-sharing via sharing stories and experiences both in staff meetings and “on-the-fly” in the course of daily work. While this sharing has enormous value, it is informal and does not result in the creation of permanent organizational resources that increase capacity and effectiveness. Increasing the performance and effectiveness of staff typically takes the form of formal training sessions that address the content or process of the work, and team or management meetings.

The purpose of this project was to create a knowledge model that would represent a common context for both the community health and environmental health staff. This goal is to increase effectiveness by enabling staff to align their work, their decision-making priorities with the guiding principles, values and goals within this common context. Two key goals of the agency director who sponsored the project were to foster a common vision of public health and the agency’s work to promote and improve the health of the community and to reduce the time and cost of integrating new staff into the agency.

3.2 Attributes of the Participating Team

The participants in the knowledge elicitation and concept mapping were five (5) community health staff, three (3) environmental health staff, the chief medical officer, the agency director and the finance manager. The participants were selected and invited by the agency director. The average length of employment in the agency was 12 years for the community health nurses and 6 years for environmental health staff. The agency director is a very experienced public health professional who has held her position for 10 years.

3.3 The Knowledge Elicitation and Concept Mapping Sessions

This project involved a total of eleven (11) knowledge elicitation and concept mapping sessions with the director and staff of the agency. Four (4) of these were with groups of 7-13, four (4) were with a small group of 3-4 staff involved in developing a key sub-concept map, and three (3) were with the director to review and format the emerging concept maps. The sessions with the larger groups were 4 hours in length, the small group sessions were 2 hours and the sessions with the director were typically an hour or less.

The group was diverse and management has cultivated an environment of respect for the knowledge, thinking and experience of each staff member. As a result, in some sessions the focus shifted as different staff contributed their knowledge and perspective.

The focus question identified by the director was: “What are the core knowledge and capabilities needed by an effective public health organization.”

The knowledge elicitation process followed the process developed by Prof. Joseph D. Novak at Cornell University and the Institute for Human and Machine Cognition (IHMC). Both the knowledge elicitation and the concept mapping were done by the consultant, in contrast to the “tag team approach” used by Hoffman and Coffey at the Institute for Human and Machine Cognition (IHMC).

Following each knowledge elicitation session, the consultant formatted the maps created, generated clarifying questions, e.g. about concept hierarchy, linking phrases and knowledge gaps and sent jpeg files of the concept maps to those involved with a request for feedback. The agency director was the primary, and often the sole, source of feedback, though on one occasion the finance manager had important insights about the organization of a key sub-concept map that resulted in re-organizing the map in a way that left it much improved as a performance support tool.

The first core capability brought to the fore was a “value for relationships” and the “capacity to build and maintain relationships.” This capacity was offered and fleshed out by the community health nurses. After this session, a key member of the environmental health team commented to the agency director, “It’s the same for environmental health, but we don’t talk about it as clearly.” The clarity of this insight provided the director with evidence that the knowledge elicitation and sharing between community health and environmental health staff was serving its intended purpose.

In the course of the second large group session, one of the community health nurses said, “What we do is make tough decisions.” When asked for an example of a tough decision, making the “decision to file a child protective services report” was offered. Several public health nurses and one environmental health staff contributed to the creation of this important sub-concept map. A major insight shared in the course of creating this map was the importance of the concept of “breaking the cycle of intergenerational violence,” (i.e., prevention) as a guiding principle in community health work. Filing a child protective services report means taking on a difficult situation with the family involved, especially the parents. Navigating this challenge successfully requires extremely high-level relationships skills as well as the ability to keep the long-term goal of prevention in focus.

The sub-concept map of “Scientific Knowledge” was created over the course of several sessions, and a one-on-one knowledge elicitation with the agency director.

The third large group knowledge elicitation session was diffuse and the focus shifted often. Several staff questioned the purpose of the project. The differences between the perspective and work of public health and environmental health came to the fore. One senior environmental health staff said she did not “think this way.” After considerable exploration of diverse foci, the environmental health staff present agreed that a concept map that would provide a decision-support tool for prioritizing response to citizen complaints would be useful. It was explained that at the current time, each staff has his or her own way of prioritizing and there is no shared set of principles or guidelines for decision-making. As a result, it is difficult for staff to respond to questions from citizens about how or why a decision was made, or why their complaint has not been addressed.

The remaining knowledge elicitation sessions were devoted to the development a concept map of the “Environmental Health Complaint Response Prioritization Process”. Core participants were two environmental health staff, the agency director and the finance manager – a long-time employee of the agency who is very familiar with its work. Typically, only the agency director provided feedback to the jpeg files of the concept maps sent for comment. The finance manager was one of the key exceptions to this rule. She made a major contribution to re-organizing the top part of the concept map in a way that made the inter-relationships much clearer. The final session was with a larger group to review the whole

knowledge model.

4. The knowledge model

The knowledge model created during this project consists of twenty (20) concept maps:

- One top map
- Four (4) primary sub-concept maps -
 - Scientific Knowledge
 - Value for Relationships/Capability to Build and Maintain Relationships
 - Decision to File a Child Protective Services Report
 - Process to Prioritize Citizen Complaints to Environmental Health
- Fifteen (15) smaller concept maps that clarify the concepts in the four primary sub-concept maps.

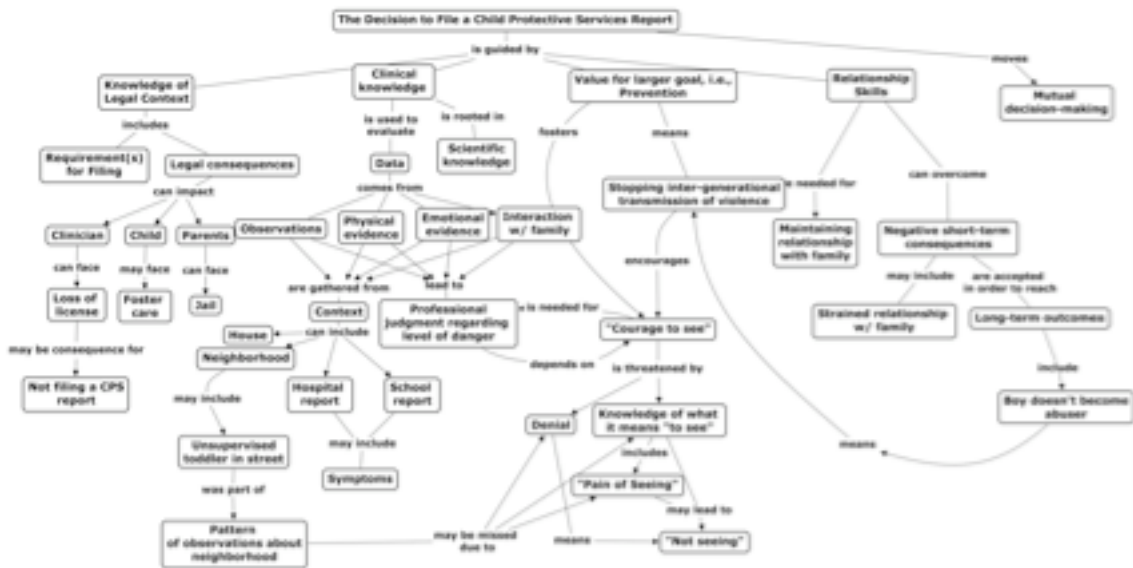
Focus Question: What are the essential knowledge and capabilities needed for Jefferson Public Health to effectively protect and improve community health?



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Figure 1. Top Concept Map

Focus question: What core public health knowledge and capabilities guide the decision to file a Child Protective Services report?



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“I had anticipated parallels between caring for the community and for our piece of the planet, but the mapping clearly demonstrated how we are dealing with two sides of the same coin. I’d like to see the language and approaches to human and environmental health become increasingly consistent over time.”

“Team-wise, the Little Quilcene example was very instructional as it illustrated how important it is to ask the right questions and identify preferred outcomes early in the compliance process.”

“As I deal with projects though, I will refer back to the mapping exercises to envision how my work interfaces with the larger JCPH and department goals.

Suggestions for improvement included having more staff participate.

The agency director reported her goal of creating a common language and common vision for community health and environmental health had been advanced by the project. “ “ In light of the financial crisis and budget cut-backs, no new staff have been hired, so it is not possible to say with certainty at this time that the concept maps and the increased alignment among existing staff would reduce the time and effort needed to get new staff “up to speed,” but it seems very possible that this could be the case.

The finance manager who made major contributions to the concept map, “Environmental health process for prioritizing complaint investigations” is now serving in a role as virtual head of operations and is using it as a tool to enhance consistency and quality with the environmental health team.

By clarifying the “big picture,” including guiding principles, values and goals, as well as gaps in tools and procedures to help staff know what the “right things to do” are, the project made important contributions to the client’s goal of increasing effectiveness.

In “Out of the Crisis,” W.E. Deming, father of total quality management, wrote, “If you want to improve the performance of an organization, don’t try to change the people, change the infrastructure.” Peter Drucker said something similar, “We will have to run our organization with the men and women as they are!...We cannot expect to get the performance we need by raising our standards for abilities...We have to learn to make better use of people’s strengths.” (Drucker, XXX) The shared process of eliciting and clarifying the core knowledge, capabilities and guiding principles needed in order for a public health agency to be effective helped the participants to do what Drucker calls for – to make better use of their strengths – their knowledge, their experience, their commitment. The concept maps and visual knowledge model that was created serves in the role of as a customized knowledge infrastructure and fosters strategic alignment, and individual and organizational effectiveness.

6. Summary

This article describes a project to use team knowledge elicitation and concept mapping with the community health and environmental health staff of a public health agency to enhance organizational effectiveness. The notion of effectiveness used in the project is drawn from the work of Peter Drucker who defines effectiveness as “doing the right things” in alignment with the organization’s goals and purpose. The team knowledge elicitation process led to significant insights, and increase in shared vision and clarity about the core knowledge, capabilities and values that are needed for the agency and its staff to be effective. The essential role of a focus on the core public health goal of “prevention” to guide “tough decisions” was elucidated by a senior community health nurse and represented in a concept map. Feedback from the agency’s staff and director confirmed the usefulness of clarifying and mapping “the big picture” as well as sharing the use of core public health knowledge and principles in making the tough decisions that form the core of the agency’s work. One of the concept maps has become a decision-support and management tool. One of the values of team knowledge elicitation is that it can be the source of important insights from unexpected sources. In this case, insight’s of the agency’s finance manager made important contributions to the re-structuring of a key concept map that she continues to use as a decision-support tool to prioritize

response by environmental health to citizen complaints. Due to the financial crisis, no new staff have been hired, so the director's goal of using the knowledge model to reduce the time and cost of bringing new hires "up to speed" is yet to be tested.

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References

- Drucker, P. F., (2001) *The Essential Drucker: The Best of Sixty Years of Peter Drucker's Essential Writings on Management*. New York: CollinsBusiness, Harper-Collins. p. 145.
- Drucker, P.F. (1954) *The Practice of Management*. New York: Harper & Row Publishers, Inc.
- Drucker, P.F. (1966) *The Effective Executive*. New York: CollinsBusiness, Harper-Collins.
- Novak, J. D. (1998) *Learning, creating, and using knowledge: Concept Maps as Facilitative Tools in Schools and Corporations*. Mahwah, NJ: Lawrence Erlbaum Associates. p. 97.
- Novak, J.D. (2004) correspondencia con la autora.
- Briggs, G. Shamma, D.A., Canas, A.J, Carff, R., Scarggle, J. and Novak, J. (2004) *Concept Maps Applied to Mars Exploration Public Outreach*. Proceedings of the First International Conference on Concept Mapping. Canas, Novak and Gonzalez (Eds.). Pamplona: Spain.
- Bowen, B. & Meyer, M. (2008) *Applying Novak's New Model of Education to Facilitate Organizational Effectiveness, Professional Development and Capacity-Building for the New Teacher Alliance*. Proceedings of the Third International Conference on Concept Mapping. Canas, Reiska, Ahlberg, and Novak (Eds.) Tallinn, Estonia & Helsinki, Finland.
- Perez, R. & Bowen, B. (2008) *Cmaps: A Useful Tool for Improving a National Environment Monitoring System Design*. Proceedings of the Third International Conference on Concept Mapping. Canas, Reiska, Ahlberg, and Novak (Eds.) Tallinn, Estonia & Helsinki, Finland.
- Fourie, L.C.H. (2008) *The Value and Use of Concept Maps in the Alignment of Strategic Intent*. Proceedings of the Third International Conference on Concept Mapping. Canas, Reiska, Ahlberg, and Novak (Eds.) Tallinn, Estonia & Helsinki, Finland.