Fragmentation

Knowledge about a complex social problem is distributed among diverse stakeholders.

Collective Definition

How might we engage stakeholders with diverse perspectives in collectively defining the problem?
From Fragmentation to Collective Definition

Engaging Stakeholders in Collective Problem Definition

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Research Question

How might the integration of models for knowledge sharing and co-creation enable diverse stakeholders to meaningfully engage in collective definition of a complex social problem?

Definitions

Complex Social Problem
Complex Social Problems are social system problems that are ill-formulated and confusing. (Buchanan, 15 - 16).

Stakeholders
Stakeholders are people impacted by the problem.

Diverse Stakeholders
They are individually diverse and may come from different disciplines, such as accounting or engineering. Stakeholders may also be a part of different organizations with different goals (Conklin 27 - 29)

Knowledge
Knowledge includes expertise which is unique tacit knowledge that is extensive. (Karhu 432)

Knowledge Sharing
Knowledge sharing is the process where the knowledge owners externalize the information, and the knowledge receivers reconstruct it (Hendricks 93).

Co-Creation
The practice of developing systems, products, or services through collaboration with stakeholders (Ramaswamy and Gouillart 4).

Collective Definition
Collaborating on the development of the problem definition (the mission of the project) (Rittel 390).
Sub-Questions

1. What are the key aspects of knowledge sharing models that enable an individual’s tacit knowledge to be shared in a collaborative setting?

2. What are the key aspects of co-creation models that enable stakeholders to create shared meaning and broader perspectives of the complex social problem?

3. How might the key aspects of knowledge sharing and co-creation relevant to defining a complex social problem be integrated into a framework or process for meaningful engagement?
Justification

"A challenge is socially complex when the actors involved have different perspectives and interests; such challenges cannot be successfully addressed by experts or authorities, but only with the engagement of the actors themselves."  Kahane

Including stakeholders, the people impacted by a problem, is a rising trend. In the US, stakeholders are more likely to be engaged in reviewing proposed solutions that a small group of experts may have created. As designers move away from this traditional approach and seek to actively engage people in the earlier phases of design, new challenges are encountered. One such challenge is engaging diverse stakeholders in defining their complex social problems.

Complex Social Problems

Complex social problems have several characteristics that contribute to challenges when diverse stakeholders attempt to frame a problem utilizing participatory methods, such as co-creation. A complex social problem, such as unemployment or hunger, may involve diverse stakeholders from government, for profit and non-profit organizations as well as volunteers and people directly facing the social challenge. Barriers to collectively defining a problem can arise when stakeholders believe either that their version of the problem is the “correct” version of the problem or that everyone shares their view of the problem (Conklin 29).

Other characteristics of complex problems include the inability to create a defined list of possible solutions and the absence of a right or wrong solution; instead there are numerous solutions that have varying degrees of acceptability for different stakeholders (Rittel 392-393). Social tension may arise when one solution is viewed as optimal for some stakeholders and unacceptable for others. Care must be taken, or this social tension may lead to a process that sacrifices innovation, resulting is some stakeholders becoming “winners” and others becoming “losers”.

Why engage diverse stakeholders?

Despite the challenges posed by diverse stakeholders, there are reasons for engaging stakeholders in solving complex problems. Due to the complex nature of these types of problems, no single individual is an expert in solving them. The people with the best knowledge of the problem may be those who are most impacted by it (Rittel 394). Therefore, people should have an opportunity to engage in solving the problems that impact them. Failure to consider stakeholders’ different needs, views and perspectives may result in consequences such as lack of buy-in or even sabotage (Conklin 6). Finally, stakeholders have different expertise, values and perspectives. Without this diversity, solutions may be limited or predictable (Sanders and Simons 33, Kahane 88).
When to engage?

Next, one must determine when to engage diverse stakeholders. Collective problem definition drives the front-end of the design process (Sanders and Simons 33). This early inquiry sets the tone for the types of ideas that will be generated and the types of criteria that will be used to evaluate possible solutions. One of the first steps in addressing a complex social problem is to begin to make judgments about the problem. These judgments are not created by scientific method, but are created by engaging in exercises about what “ought” to be (Rittel 394). Because of this, participation in the front end can have long range consequences (Sanders and Stappers 5). Therefore, engaging stakeholders in the early part of the design process may make the most impact.

Challenge to collective definition

However, there are challenges to collective definition. One challenge is that the knowledge required to solve complex problems is distributed among stakeholders (Arias, Eden and Fischer 1). Different stakeholders carry different knowledge and perspectives about the problem. Knowledge fragmentation can stem from diversity of individual experiences, company affiliations or professional training, this knowledge contributes to diversity of views and perspectives of the problem. It is challenging to collectively define a problem when there are diverse perspectives about the problem and the solution.

“When I look back on the diverse social change teams I have worked with over the past twenty years, I notice one conclusion on which they all agreed: The complex and vital challenges we face cannot be addressed effectively by any one leader or organization or sector, and so we need to build a capacity for co-creation.”

Kahane

How can knowledge sharing and co-creation help?

The hypothesis of this research is that co-creation models and knowledge creation models can be combined to enable diverse stakeholders to create a shared and broader perspective of the problem and contribute to a shared understanding. A large part of information is experience based and cannot be articulated in codified forms (Lam 489). Therefore, social mechanisms like face-to-face co-creation experiences may enable participants to share and create knowledge that lead to meaningful engagement in the definition phase of addressing a complex social problem.
Limitations

Process

Mulgan states that despite the trend toward social innovation, the process of social innovation remains understudied (146). This research project is intended to focus on a small slice of the innovation process. The scope of this research is to explore ways to engage stakeholders in collective problem definition. The decision to focus on engaging stakeholders in problem definition was made because of the impact that can be made by engaging stakeholders early in the creative problem solving process (Sanders and Stappers 5). While identification of stakeholders to include in the process needs to occur before stakeholders can engage in problem definition, this research project assumes that stakeholder selection has already taken place and that diverse stakeholders with different perspectives have already been selected. The stakeholder selection process is necessary to ensuring that stakeholders representing diverse views and perspectives of the problem are included in the problem solving process, and this diversity is imperative to ensuring success of a social project.

Efforts to make social change do not end with problem definition. While it is possible that the findings of this project may have some relevance for other stages in the creative problem solving process, further research outside the scope of this project may be required to understand the combinations of co-creation and knowledge sharing in other stages in the process.

Stakeholder Diversity

The knowledge about the complex problem is distributed or fragmented among diverse stakeholders (Arias 85). Because fragmentation of knowledge is a barrier to problem definition (Arias 85, Conklin 27-29), and diverse perspectives are necessary for innovation (Sanders and Simons 33, Kahane 88) the focus of this research is to understand how to leverage the diversity of stakeholders’ knowledge and experiences related to the social problem being addressed. This will be explored through the study of models for knowledge sharing and co-creation.

The studies of other aspects of diversity, such as profession, race or individual learning styles, are out of scope.

Knowledge Sharing

Because there are existing models for knowledge sharing, this research is not intended to create a new model of the knowledge sharing process. The focus will be on understanding and synthesizing existing knowledge theories in order to create a model for creative problem solving definition with diverse stakeholders. The research will focus on knowledge sharing models that enable an individual to share tacit knowledge, pertaining to the complex social problem, with a group.
Co-Creation

In terms of co-creation, Ramaswamy and Gouillart’s definition, a type of collaboration where stakeholders are engaged in the creation of new systems, products or services, has been selected (4). Other definitions may refer to any creative activity between people, but that definition is too broad. This research is specifically designed to focus on engaging stakeholders of a complex social problem. Interactions between designers and interactions between a business and its stakeholders are out of scope.

Research Approach

This design research will be theoretical research that is informed by case studies (practice). There is no intent to perform field research within a specific context.
Literature Review Matrix

Ackoff and Rovin
Arias et al.
Basadur
Basadur, Pringle, Speranzini & Bacot
Blummer
Buchanan
Concklin
Enserink and Monnikhof
Gorman
Hendriks
Kahane
Karhu
Lam
Leonard and Sensiper
Mulgan
Nonaka
Paavola and Hakkarainen
Ramaseswamy and Gouillart
Rittel
Sanders
Sanders and Simons
Sanders and Stappers
Sanders and Westerlund
Schon
Stahl
Weick and Roberts
Literature Review


“The United States is the only industrialized society without universal health care” (Xi). Education, illiteracy and poverty are all issues impacting society (xi). Ackoff and Rovin provide a perspective for looking at society as a system. The main point is that there is often a lot of effort to get rid of something that we don’t want, such as the prohibition movement, and sometimes not enough effort put into designing what we do want (2). The authors write about the importance of systems thinking and understanding the connection of the various parts (5). The book concludes with a chapter on development. The challenge is summarized by asking, “how do we bring about change in the minds that make up a society, minds that resist change with a strength that challenges even the best minds within and outside society” (152)? The authors view society as a system where service to stakeholders is paramount.


Rittel’s definitions of “wicked problems” are used as a foundation for this article. Through the lens of human computer interaction, the authors discuss the need for collaboration and the information challenge that is posed when no single individual has all of the information about a complex design problem. The article discusses how this distribution of knowledge challenges technical knowledge sharing solutions. Through a transportation case study, the authors elaborate on the features of the Envisionment and Discovery Collaboratory (EDC). The EDC is a research prototype where participants work around a table and create a physical model of the problem that can interact with computer simulations. Participants gain understanding of the problem from different perspectives by interacting with the models. In effect, the EDC is creating an environment where participants can share knowledge and create solutions together.


Basadur describes, Simplex, a detailed process for innovation. The process is based upon Basadur’s corporate product innovation experience. The beginning part of the process, problem formulation, focuses on sensing the fuzzy situation, gathering facts and defining the problem. During this phase of the project, there are several iterations of diverging and converging. This process is based upon product development within a company setting. Therefore, the focus is on the process and there is little to no mention of engaging stakeholders in the process.

While the Simplex process for problem definition contains steps that may be applicable to definition of a complex social problem, the process is not specifically designed for including diverse stakeholders.

The article describes the problem definition phase in more detail than is covered in Basadur’s The Power of Innovation. The focus of the paper is problem definition between two parties with potential for conflict. In addition to covering the Simplex process, some conflict management theory is also discussed. One of the main points of the article is the process of “super-optimizing”, or increasing the potential for a win-win solution. The article concludes with a case study on union management bargaining.


In this book, American sociologist Herbert Blummer describes his perspective of the nature of social problems. His premise is that social problems do not exist for a society unless that society is aware that there is a problem. Blummer states that social problems are a result of the “collective definition of the society” and that the society’s definition gives the problem its nature and shapes what will be done about it.


Buchanan describes the origins of the word “design” and design thinking. Next he discusses the relationship of design and the liberal arts. In the process of describing the history of design, Buchanan addresses the nature of wicked problems and the diverse participants who are “drawn together because they share a mutual interest in a common theme: the conception and planning of the artificial.” When defining wicked problems, Buchanan quotes Rittel who describes wicked problems as a “class of social system problems which are ill-formulated (15).” Buchanan explains that communication is possible when the individuals discover what is useful in each other’s work.

Writing from the systems design perspective, Conklin describes the interrelationship between wicked problems and what he calls knowledge fragmentation of diverse stakeholders. This fragmentation can occur when people have differing perspectives, intentions and understandings of “wicked problems”. Conklin goes on to explain that social complexity, or the number and diversity of players who are involved in a project can be one aspect of a wicked problem (23). He describes social complexity as working a social network where there are varying levels of participants, influencers, controllers and organizations. He describes shared understanding and shared commitment as the opposite of fragmentation due to the complexity of the stakeholders. Understanding of the problem is gained by understanding the solution and that this occurs in a non-linear fashion. The book is about Dialogue Mapping which is the use of a specific software tool to map what people are saying, on a shared visual display, using the IBIS notation rules. The tool is used to externalize the tacit knowledge and create a shared understanding or collective intelligence which can then be used to gain the shared commitment to solve complex problems. The concept is based upon the IBIS (issue-based information system) developed by Rittel (13).


Enserink and Monnikhof are making a case for increasing public participation in issues regarding public policy. They state that participation is increasing in the impact assessment and project appraisal phases, but there is room for more participation in the design and alternative evaluation phases. The focus of the article is on improving the quality of the proposals by increasing participation. One issue that is highlighted is that public preferences may “merely be noted by the experts who design and decide” (316).

The authors outline criteria for judging the outcome of the participatory process. One of the key outcomes is “Agreement on a shared definition of the (problem) situation” (318). In addition, the authors suggest a process of decision making where all parties create a negotiating body of knowledge that includes acceptable alternatives. Participants need support to participate in these activities. This support can include access to experts and shared information (320). Keys to these outcomes included sharing of information and learning using solutions and their own assumptions. The information is managed and shared by using visual tools.

The social aspects of sharing technical knowledge are outlined in this article. While the article is focused on scientific knowledge, the examples include the use of knowledge as expertise with individuals outside of the fields of science. Three levels of sharing expertise are presented. The first level is none, the second is interactional and the third level is contributing. In the contributing level, people from one discipline learn enough about another discipline to make real contributions. One can shift between these levels as one learns more about the problem and as the problem shifts. Gorman then links these levels to a science and technology concept of “trading zones.” Trading zones as described are characterized by having a lack of hierarchy, a system or technology that can serve as the boundary object for the interaction. In these trading zones, both individual and collective mental models are developed where parts of the imaginings are tacit knowledge. The mental model as described by Gorman, can include tacit knowledge and can have kinesthetic or visual components. In the third level of sharing, the boundary object moves from the boundary to a growing center of shared expertise, a shared representation that includes knowledge from all participants.


Hendriks, a professor of Organizations and Knowledge at the Institute for Management Research of the Radboud University Nijmegen, focuses on explaining a model for transferring knowledge in an organizational context. While the article has a focus on Information and communication technology (ICT), Hendriks presents models for sharing knowledge and expertise. In his model for knowledge sharing, he includes social barriers as an obstacle to knowledge sharing. Hendriks also presents models of motivations for sharing knowledge. He describes knowledge sharing as a “touchstone for creative new ideas” (97).


From a design perspective, Kahane discusses social change theory and provides accounts of several social changes efforts including experiences in South Africa. His main point is that one must utilize power and love in a balanced way in order to make progress in social change efforts.

Kahane utilizes a process called Theory U, which was developed under a research project of Otto Scharmer. The theory consists of sense, presencing and realizing. Kahane provides case studies of using this process with groups to build shared understanding needed to move forward with decision making in complex social problems.

The author’s intention is to argue for the need for knowledge stewards to capture tacit knowledge for use in a business setting. A knowledge steward, as described by Lam, is a person designated to extract tacit knowledge and codify it for use in the larger organization. While, Lam’s context is not collaborative, some of the methods, such as storytelling, and the descriptions of the relational aspects required for knowledge transfer can be applied to a collaborative setting.


Lam explores the relationship between tacit knowledge and innovation activities by creating a conceptual framework for understanding knowledge at the individual and collective levels. She describes four different models within a society; professional model, bureaucratic model, operating adhocracy, and an organizational community model. The organizational community model is based upon Japanese culture where tacit knowledge is more valued within corporations. The interaction between explicit and tacit knowledge is vital for the creation of new knowledge. A large part of human knowledge cannot be easily articulated in codified forms and must be transmitted socially.


The article bases the definition of tacit knowledge on Michael Polanyi’s work. Including the premise that all knowledge has elements that exist on a spectrum with one extreme being knowledge that is explicit, codified, structured or explicit, and the other extreme being knowledge that is tacit, subjective, experiential and created for the “here and now” (113). The tacit knowledge is important for problem solving and group interactions “at the conscious level can stimulate and enhance these activities; interplay among individuals appears essential to the innovation process” (115).

Mulgan defines social innovation as “innovation activities and services that are motivated by the goal of meeting a social need.” He notes the trend toward social innovation and states that despite the trend social innovation remains understudied and the amount of funds spent by government and non-government organizations is relatively small.

Two lenses for innovation are discussed. In the first, change is driven by a small number of “heroic, energetic and impatient individuals.” In the second, individuals are the carriers of ideas and change is more of a social movement. While the innovation process he describes is similar to Basadur’s process, he does not include a problem definition phase.


Nonaka provides a conceptual framework for learning of individuals, groups and organizations. His model is called a spiral model that includes a continual dialogue between tacit and explicit dimensions of knowledge. His process includes a process of socialization followed by a process of externalization. In discussing applicability to a self-organizing team, Nonaka points out the importance of creating a space in which individual perspectives are articulated.


The authors compare and contrast three different models for knowledge acquisition or learning. One model, the acquisition metaphor, focuses on the knowledge acquisition of an individual (536). The second, participation metaphor, is defined as learning through participating in various cultural practices (538). The third model, the knowledge-creation metaphor, is a model for collective learning and advancing the knowledge of collaboration through development of common objects (536). The third model focuses on “the way people develop mediating artifacts” (539). These artifacts can include conceptual artifacts, practices and products that should be created in a manner that allows the tacit knowledge of individuals to be produced on the communal level (546). While a focus of the article is on education, the authors note the important of the knowledge-creation metaphor in innovation (546).
Written from a perspective of creating value in businesses, the book is about enabling individuals to create value through personal engagement. This change in viewing customers as co-creators rather than consumers, impacts the conventional business roles of strategy, innovation, marketing, supply chain management, human resources management and information technology. Co-creation is explored through several business examples.

In the Infosys model, there are five pillars of innovation (88-89). The first is access to contextualized knowledge and information. The second is a network of experts and partners who can bring diverse viewpoints and share knowledge across different organizational silos. The third pillar that is discussed is the use of tools and methodologies that enable collaboration and communication during idea generation, simulation and evaluation of innovations. Finally the fifth pillar is providing collaborative, visual and communication tools that enable Infosys and its clients to co-create experiences with their customers.

In regard to describing a systems analysis approach to planning problems, Rittel uses the term “wicked problem” and defines several aspects that constitute a wicked problem. This work of Rittel is foundational to Conklin’s Dialogue Mapping, Buchanan’s article on wicked problems and Aria et al. In addition to describing wicked problems, Rittel also discussed the inadequacies of using a linear or waterfall approach to solving wicked problems. He proposes a non-linear way of thinking where the problem is understood by understanding the solution.

Sanders presents an overview of the landscape of design research by categorizing design processes that view ‘users’ as subjects and the designer as the expert with design research processes where ‘users’ are viewed as the experts and become active partners or co-creators. Sanders states that a key characteristic of participatory design is the use of physical artifacts as a thinking tools. She also describes generative tools as participatory tools where it is important to ask people why they are responding in a specific way. These methods work toward understanding and empathy.
The focus of the article is on creating social value through co-creation or a “collective creativity that is experienced jointly by two or more people.” One major point of interest is the authors’ description of four different levels of creativity; doing, adapting, making and creating. The fourth level is highlighted as a level for expression and innovation.

Next, the authors explore monetary, experience and social values for co-creation activities. The social value is of particular interest to this research project. The authors state that the social value is fueled by aspirations and goals for improving the quality of human life. Visualization of ideas and opportunities is discussed as a key way to “enhance collective creativity” (30). The authors also discuss the importance of engaging “everyday” people and experts in discussing and expressing multiple points of view via personal conversations and interactions. The belief that all people are creative and will participate if they have appropriate tools is foundational.

The user-centered design approach, where the user provides input into the design process has been driven in the US while Northern Europe has been recently focused on viewing the user as a partner in designing. Co-creation is defined as any collective creativity. Co-design is more specific because it refers to collective creativity across the whole design process. According to the definition supplied by the authors, co-creation has been happening for years in Norway, Sweden and Denmark, but it was called participatory design.

Co-creation requires a belief that all are capable of creating. It also requires some control to be given to the participants who may not have even been a part of business conversations in the past.

Multiple concepts of co-design space, the space situated at the front end of the design process for complex changes like social changes, are presented for consideration. The first is the physical space where the design work is done, the second is the design activities. The final space is the space of the future or the space of what might be possible. Regardless of how one defines the co-design space, the knowledge of the participants is one of the important aspects. One needs to carefully consider the preparation, facilitation, documentation and visualization and reflection of the co-design experience.

Foundational to engaging participants is a belief that all stakeholders have a distinct perspective and are important in gaining an understanding of the future possibilities. The emphasis on the “co” in co-design accents the importance of the participants and the creation of knowledge about the desires of the future. The authors conclude by suggesting that all three definitions are important to the collaborative creation of knowledge.


Stahl presents a knowledge building model that integrates individual and social knowledge building. The model shows that knowledge is the product of social communication, “a socially mediated product” (72). Public negotiation through a shared language results in shared collaborative knowledge. Representational schemas may also be created to express the shared knowledge.


In writing for a conference on artificial intelligence and the possibilities of using computers to design, Schon describes design knowledge as knowing in action. Computational representations of this type of knowledge are inadequate because human designers interact by having a “reflective conversation with the situation” through sensory experiences like sketching. Thinking is done through shifting relationships and seeing in a new way enabling an individual’s subjective judgement. This shifting results in a type of experiment where the judgement may be made tacitly. In the paper, Schon demonstrates the human thought processes by walking through the design actions of an architecture design student and observing the impact of her decisions.

Through active seeing and decision making Schon explains that individuals construct their own design world and invent moves through which resolution will be sought. When engaging in social construction, there are differing views of reality which require people to engage in understanding other’s design worlds.

Weick, has a Ph.D. in Psychology from The Ohio State University and he and Roberts are writing this article from the perspective of business, such as an airline, that need to provide operational reliability. Their supposition is that organizations that are required to perform with this level of reliability need to have aggregate mental processes that are more fully developed than organizations concerned only with efficiency. The article focuses on describing collective mental process. The discussion of ad-hoc group formation is relevant to the topic of co-design.
Prototype

Analyze and Synthesize the relationship between collective definition and the key aspects of knowledge sharing and co-creation

1. Pattern finding
2. Categorizing
3. Sensemaking
4. Model relationships

Result: Models of the key aspects of knowledge sharing models that enable sharing of tacit knowledge

Research Plan

Collection

Gather research on key aspects of sharing individual tacit knowledge in a collaborative setting

• Case studies
• Models for collaborative knowledge sharing

Result: Case studies and knowledge sharing models

Analysis and Synthesis

Gather research on key aspects of co-creation models that enable stakeholders to create shared meaning and broaden perspectives

• Case studies
• Textual research

Result: Case studies and knowledge about co-creation

Analyze key aspects of co-creation models

1. Pattern finding
2. Categorizing
3. Sensemaking
4. Model relationships

Result: Model of key aspects of co-creation models that enable stakeholders to create a broader perspective

Analyze and Synthesize data on problem definition

1. Pattern finding
2. Categorizing
3. Sensemaking
4. Modeling

Result: Process model for problem definition

Prototype

Determine appropriate persons to engage in providing feedback for the prototype

Develop a framework for collective problem definition with diverse stakeholders

Get feedback

Feedback

Analyze and Synthesize the relationship between collective definition and the key aspects of knowledge sharing and co-creation

1. Pattern finding
2. Categorizing
3. Sensemaking
4. Model relationships

Result: Relationships between knowledge sharing, co-creation and collective definition

Start

Gather research on collaborative problem definition

• Textual research
• Case Studies

Result: Process for collective problem definition