Issue Mapping Strategy: Process of Discovery, Places of Invention and Design Process Fallacies

Kaja Tooming Buchanan

> *Take things you know. You can suppose them to be other things which you both know and perceive, or to be things you do not know, but do perceive, or you can confuse two things which you both know and perceive.*
>
> Plato, "Theaetetus"[1]

Introduction

Practice-based research fields such as design often deal with complex systems and situations of uncertainty in human experience. Complexities, when misinterpreted and challenged by judgments that are derived from fallacies of arguments or based on preferences rather than a proper process of reasoning, may easily mislead the inquiry. Thus, there is a need to have a clear strategic approach in inquiry to address the complexities that are characterized by controversies and ambiguities.

In this article I explore the challenges faced in design practice, where the approach to inquiry depends on understanding the context as a whole with all of its interconnected parts, and its successful transformation from one developmental phase to another. A first critical mistake may already appear in the exploratory research phase of problem finding that could lead the inquiry in the wrong direction. Therefore, it is crucial to have a clear strategic approach that helps to avoid this kind of failure, where the success of an inquiry depends on how well complex situations are understood and the complexities addressed. Awareness of indeterminacy is not enough. An effort to explore problematic situations that lead to the understanding of existing problems is decisive for successful product development. The specific goal of this article is to reflect on the meaning behind and the significance of an approach that I call the *Issue Mapping Strategy* in the exploratory research process of problem finding, and discuss the challenges encountered in the process of discovery that may lead to *invalid* topics and thus to design (process) fallacies. However, the goal is not to give a detailed technical description of the Issue Mapping process from a methodological

1 *The Collected Dialogues of Plato: Including the Letters.* Ed. by Edith Hamilton and Huntington Cairns. Translated by Lane Cooper et. al. USA: Pantheon Books, Bollingen Series. 1961. Third printing, 1964, 899.

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standpoint as an isolated practical tool. Nor is the goal the comparative analyses of all kinds of mappings or approaches that focus on problem finding.[2] Instead, I define Issue Mapping as follows: Issue Mapping is a *strategy* for an unfolding discovery process for the purpose of exploring problematic situations and identifying *places of issues* that finally disclose the *central problem*, based on evidence. As a strategy, its importance is significantly larger as a part of the general inquiry. It should not be interpreted as merely a method.

In this approach, *interconnectedness* is a central feature and is discussed in this article on three levels. The first level is the *process as a whole* and the role of the Issue Mapping Strategy in it. The second level is the relationship of *theory and practice*. The third level is specific topics treated as *places of discovery and invention*.

On the first level of interconnectedness—the *process as a whole*—the effort is to grasp the whole, unified process that is contextualized in the cultural and social settings of the environment. This involves three major phases in product development: exploratory, generative, and evaluative. The transformative process from one research phase to another is decisive for final success. The emphasis in this article is on the exploratory research phase and its interconnectedness to the two others. The *Issue Mapping Strategy* is a research tool whose goal is to make a transformative process from the exploratory research phase that culminates with problem finding to the generative phase of developing ideas successful. But its meaning needs to be understood in relation to the inquiry as a whole.[3]

On the second level of interconnectedness—the relationship of *theory and practice*—the theories that help to build arguments and understand relevant *topics* as subject matters are important. This is because multiple meanings have to be discovered and understood in complex situations, especially in social and cultural settings. This is where an interdisciplinary approach and knowledge from different fields provides valuable resources.

On the third level of interconnectedness—the *places of discovery and invention*—the focus is on the "places" in which issues and ideas are discovered. These are known as *commonplaces*. Since commonplaces are topics about all subject matters, the process of discovery is supported by theories that help to determine the places for discovery and to analyze their contextual belonging and multiple meanings. Commonplaces, as places for discovery of arguments, are the starting point for the general inquiry. They also are an important first step in the Issue Mapping Strategy for discovery of places for exploration of the unknown, that is, places of *issues*.

These three levels blend into each other, and arguments are intertwined through all levels without mechanical separation or isolation. Theme and supportive arguments in this article are

2 For example, the approaches that are discussed by Horst W. J. Rittel and Melvin M. Webber, Donald A. Schön, Herbert A. Simon or others.

3 The Issue Mapping Strategy is not limited to any particular approach to inquiry. It could be used in *dialectical*, *rhetorical*, *design science* or *productive science* inquiry.

developed successively and move from general understanding to particular. Key concepts, such as *issues*, *ideas*, *places*, *commonplaces*, *topics*, *products*, *invention* and *discovery*, are discussed and explained in relation to their contextual belonging and their meaning in this text.

Places of Invention in the Process of Discovery and Design (Process) Fallacies

Issues and ideas are places of invention that are discovered in commonplaces.[4] We think we know the meaning of these concepts and, therefore, in everyday language we use these terms with great confidence. Confusion, however, occurs when we relate these concepts to the design research process, where *invention*, as a creative mode of departure from accustomed circumstances, depends on the process of discovery of the unknown that finally manifests in the product of invention. Moreover, determining issues is often mistakenly separated in design practice from the process of invention as a separate thing from ideas that affect the final outcome. This conflict leads to disconnection, where the places of the unknown are ambiguous, since the paradoxes, conflicts, and contradictions intervene in the process of invention of knowing what the real problem is that needs to be addressed. For example, a topic that draws attention to ambiguity with its complexity is loneliness. *Loneliness* is an inchoate experience, where *being* in the world is perceived as a struggle disconnected from hope for future.[5] It is unfortunately one of the deepest concerns in our society today.[6] The qualitative experience of time in being is reflected in an emotional imbalance that distracts people from creating fulfilled experiences. The experience of time, paradoxically, is redeemable and unredeemable at the same time, since it is experienced in a reality that keeps changing, but parts of it are "frozen" and remain unchanged. Therefore, researchers spend hours exploring the complex issues behind *loneliness*—a loneliness that is characterized by perpetual solitude and affects the quality of life. The process of discovery thus depends on the researcher who needs to explore places relevant to uncover things unknown.

Since *invention* is an art of discovering new arguments and uncovering new things by argument, its meaning in the context of inquiry is to transform the customary (things known) or unnoticed (things unknown) into novelties.

From Plato's dialogues, where the ambiguities are overcome with direct conversation in finding the truth, we need to turn to Aristotle's rhetoric, which is the counterpart of dialectic. *Places* and *topics* are one of the central themes in rhetorical discussions of invention.[7] And topics, of course, are also bases for dialectical conversation to overcome conflicts and contradictions. Topics for Aristotle, however, are an important means for *logical proof* in

4 The definition and use of the term *issue* is ambiguous. In Rhetoric, it is sometimes called *status*, *constitutio*, or *quaestio*. In Ancient Greek, *idea* means "form" from the root of (ideîv)—generally, the look or appearance of a thing as the opposite to its reality. In Latin, *idea* means "species"—a nature, kind, or sort; a way, manner, or fashion.

5 This is the author's definition of *loneliness*.

6 A project that focused on the concept of *Loneliness* was led by the author in the *Experience Design* course at the College of Design and Innovation (D&I) at Tongji University in 2019. The aspect of loneliness was also reflected in projects that focused on the *blind and visually impaired* in Shanghai (2018), and *Social Distancing* in the Covid-era (2020).

7 Place (in Latin *locus,* pl. *loci*; in Ancient Gr. *topos*); Topic (in Lat. *locus*, pl. *loci*; in Gr. *topos*, pl. *topoi*). Both are ambiguous terms, not only because their meaning has changed through the history of rhetoric, but also because they designate similar meaning.

making arguments, not in finding the truth, but for persuading the audience. In his first book of "Rhetoric," Aristotle introduces not only 28 *valid topics*, but also pays attention to *invalid topics* or *fallacies of arguments*.[8] Aristotle's invalid topics are highly relevant to the challenges that designers, managers, and other professionals deal with today and struggle to overcome in their professional work. Therefore, there is a beneficial value to refer Aristotle's *invalid* topics or *fallacies of arguments* in rhetoric to the fallacies of arguments made in the design process. I call them *design (process) fallacies*.[9] Seven or more, out of Aristotle's ten *invalid* topics could easily be related to common mistakes made in design, especially in the *discovery phase* of the design process.[10] The discovery phase is the first phase in the design process where the focus is on *contextual* and *exploratory* research.[11] This phase of the design process is critically important and most crucial for the success of the entire process since it determines the final outcome—whether a product will fail or be a great success. By product here, I mean any kind of tangible or intangible products—information, artifacts, interactions, services, environments, systems, and organizations. Richard Buchanan relates these different kinds of products within the *Four Orders of Design*.[12] In a wider sense, I include also the *products of invention* as well as the *process of invention*, since they include the statement and proof of *what* is discovered in each research phase, and they apply to the fields of design problems by discovering and testing arguments about things unknown.

Since the discovery phase has decisive influence on the following *generative* and *evaluative* research phases of the design process, it deserves special attention. Finding issues and formulating the problem is the most crucial part of the discovery phase's exploratory research.[13] John Dewey argues that "the determining of a genuine problem is a *progressive* inquiry," and "if we imagine that the problem is definite and clear, inquiry proceeds down a wrong track." And *inquiry*, for Dewey, "is directed and controlled transformation of an indeterminate situation into a determinately unified one."[14] Therefore, there is a conflict between imaginative thinking without proof in indeterminate situations and *knowing* what the genuine problem really is. Knowing resonates well with Plato's dialectical discussion about the search for the *nature of knowledge* and his warning predication "not to think they know when they do not."[15] A genuine problem designates a *central problem*. A *central problem* is a synthesis of many particular issues that are integrated by careful analysis of the characteristics of similar topics to broader areas of issues.[16] *Issues* are *places*, where in the process of invention, the systems of action, matter, form, and function are explored in search of arguments for the explanation of the unknown.[17] Issues are embedded in problematic situations and characterized by indeterminacy.

8 *The Basic Works of Aristotle*. Edited by Richard McKeon. New York: Random House, Oxford University Press, 1941, 1325–1379.

9 *Design (process) fallacies* is the author's definition inspired by Aristotle's ten invalid topics.

10 For Aristotle's *invalid* topics, see page 9–10.

11 There are many ways to make distinction of the structure of the design process. For the sake of clarity, I will emphasize three main phases of the design research process: the *discovery* (contextual and exploratory research) phase, the *generative* research phase and the *evaluative* research phase. For further discussion see Bruce Hanington, "Relevant and Rigorous: Human-Centered Research and Design Education." *Design Issues*, Volume 26, Number 3, Summer 2010.

12 See Richard Buchanan, "Wicked Problems in Design Thinking." *Design Issues*, Volume 8, Number 2, Spring 1992; and "Surroundings and Environments in Fourth Order Design," *Design Issues,* Vol. 35, Number 1, Winter 2019.

13 In many languages, the words *issue* and *problem* designate similar meaning, and the difference between these two concepts therefore is unclear.

14 John Dewey, *Logic: The Theory of Inquiry*. New York: Holt, Rinehart and Winston, 1964, 117.

15 *The Collected Dialogues of Plato*. 1964, 846.

16 This author's definition is used in the Issue Mapping Strategy to grasp the essence of the problem with its constitutive parts.

17 See Figure 1. *Issues as Places*. Kaja Tooming Buchanan, 2021. This definition by the author is discussed more in detail in the following pages. Discovery of commonplaces of arguments and determination of places for issues are important steps in inquiry and in the Issue Mapping Strategy in order to eliminate indeterminant situations. Concrete examples are given later in this article.

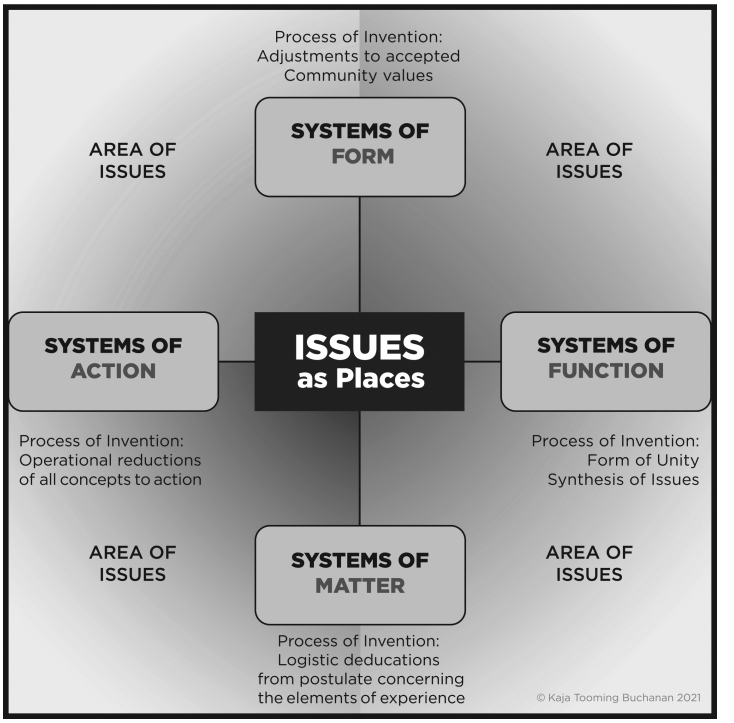

Figure 1
Issues as Places. © Kaja Tooming Buchanan, 2021.

Commonplaces of *action*, *form*, *function*, and *matter* designate here the general places of invention where the arguments are discovered. Since these are places of ambiguities that need to be understood, and places for possible problems that need to be discovered, they need to be investigated carefully as sources of information for the explanation of the unknown.

Ignoring the process of invention in problem finding leads to a failure of the product of invention itself. Therefore, *places of invention* for perception, discovery, and the explanation of the unknown must be formulated appropriate to the kinds of issues without anticipating the answers in advance. Questions, both definite and indefinite, general and particular, are made precise by determining the issue without predetermining the properties which will be found in *commonplaces* as a later discovery after having gone through the process of reasoning. It is worth noticing that "as means of inquiry the questions are as numerous as the things known, but as means of discovery the questions are as numerous as the judgment made."[18] Thus, in the process of discovery, avoiding premature conclusions that may lead to false problems is crucial and depends on the researcher who determines the issue in a question.

Here is the deciding difference between knowing things or imaging things, which you do know, or do not know. *Imagination*, of course, is important especially in the generative research phase for inventing new ideas. It is more than just the "wild thoughts

18 See Richard McKeon, "The Methods of Rhetoric and Philosophy: Invention and Judgment." In *Rhetoric: Essays in Invention and Discovery.* Ed. by Mark Backman. Ox Box Press, 1987.

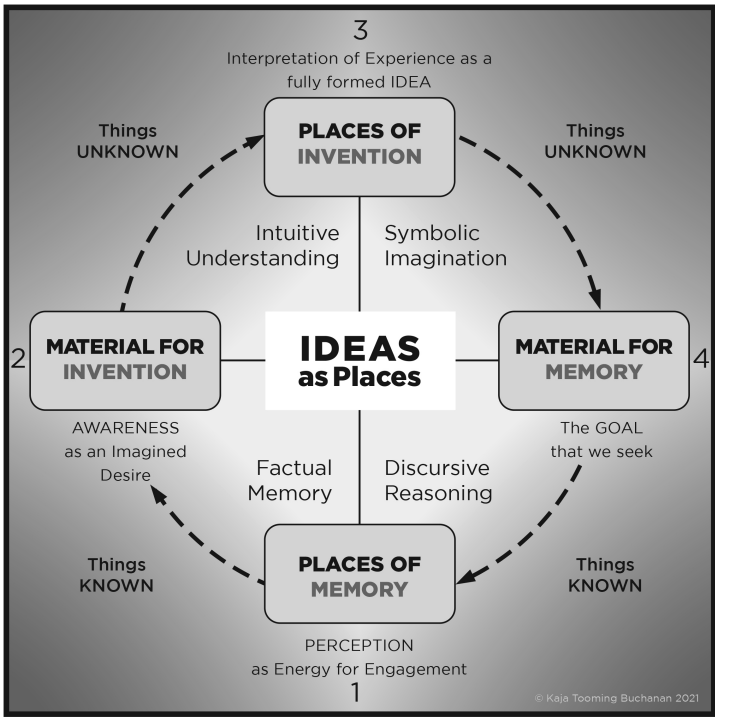

Figure 2
Ideas as Places. © Kaja Tooming Buchanan, 2021.

about things unknown." Instead, it is *esemplastic*, as Coleridge described it.[19] He constructed this new term to stretch the meaning of the word imagination. Like imagination, *creativity* is a transformative term—transformative term from "things unknown to things known," and from "things known to things unknown."[20]

Creativity operates in the interpretation of experience and derives its materials from *places of invention* and *memory* that are explored as sources of value and established facts.[21] Intuitive understanding based on discursive reasoning and things remembered provides materials for imagination.[22] Its starting point, however, is in commonplaces of *action*, *matter*, *form*, and *function*, which provide material for invention by transforming places discovered about the things unknown (places of issues) into the places yet unknown (places of ideas) that remain to be discovered.

Since in successive inquiry we deal with indeterminate situations, we must throughout the entire process "look at our offspring from every angle to make sure we are not taken in by a lifeless phantom not worth the rearing."[23] Therefore, since indeterminate situations are uncertain, ambiguous, and often full of conflicts and contradictions, we first need to discover *commonplaces* of arguments.[24] Cicero argued that a commonplace is a *place*, a seat, or a source of arguments.[25] According to McKeon "it is not itself an

19 For Coleridge, this new term in literary criticism would both aid the recollection of his meaning and prevent its being confounded with the usual import of the word. See S. T. Coleridge, *Biographia Literaria*. Volume I. Ed. by J. Shawcross, 1969, 107.

20 See Figure 2. *Ideas as Places*. Kaja Tooming Buchanan, 2021.

21 Like imagination, creativity also is an important term in various philosophic theories since it refers to places of invention and memory. For *creativity*, see Richard McKeon, "Creativity and the Commonplace." In *Selected Writings of Richard McKeon: Volume 2, Culture, Education, and the Arts*. Ed. By Zahava K. McKeon and William G. Swenson. Chicago: The University of Chicago Press, 2005. The significance of *intuition* in the creative practice is discussed in Laszlo Moholy-Nagy, "Design Potentialities". In *Moholy-Nagy: An Anthology*. Ed. by Richard Kostelanetz. New York: Da Capo Press, 1970.

22 See Figure 2.

23 *The Collected Dialogues of Plato*. 1964, 866.

24 See Figure 3. *Commonplaces and Proper Places as Places for Discovery*. Kaja Tooming Buchanan, 2014.

25 Cicero, "Topica." In *De Inventione, De Optimo Genere Oratorum, Topica*. Ed. by T. E. Page. et.al. Translation by H. M. Hubbell. Cambridge: Harvard University Press. First printed 1949. Reprinted 1960.

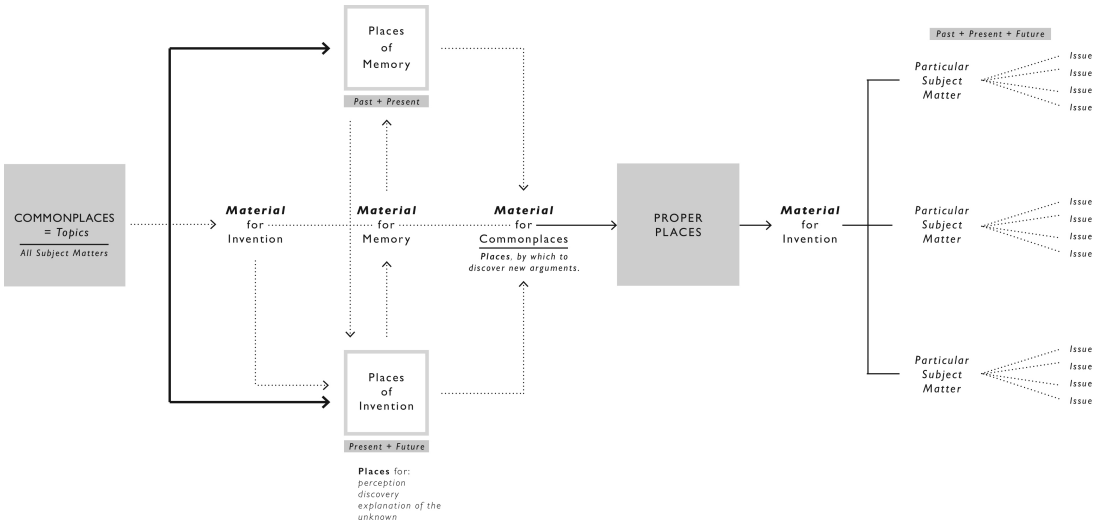

Figure 3
Commonplaces and Proper Places as Places for Discovery. © Kaja Tooming Buchanan, 2014.

argument, but a heuristic device by which issues that have never been considered before suggest distinctions and relations to be examined in search for solutions."[26] By heuristic device he means *places of memory* and *places of invention*.

To determine what is at issue refers to indeterminate situations, since it is determined by conflict or antithesis. *Indeterminate situations* are places of argument by the way in which the topics are understood in *problematic situations*. Therefore, in the problem finding process of inquiry, we first need to discover the commonplaces of arguments and determine their belonging to problematic situations. It is significant to identify issues and formulate the problem, otherwise, we might look for ideas in the wrong places—the places that refer to *invalid* topics. The invalid topics, or fallacies of arguments, might easily lead the inquiry in the wrong direction. Therefore, we cannot generate ideas before we have identified the places of issues that we then, after carefully examining distinctions and relations, can transform into ideas (solutions). Since this is one of the most crucial common mistakes made also in the design research process, I turn to seven of Aristotle's ten *invalid* topics in *Rhetoric* to discuss the fallacies of arguments in the context of the interplay of theory and practice.[27]

These seven *invalid* topics are:

1. Conclude an argument, as if at the end of a reasoning process, without having gone through the process.
2. Make a statement about the whole, true only of individual parts, or vice versa.
3. Use a single, unrepresentative example.
4. Take the accidental as essential.
5. Argue from consequence.

26 McKeon, 1987, 59.

27 This common mistake manifests especially in the exploratory and generative research phase and in its transformative process from one to another.

6. Ignore crucial circumstances.
7. Make out, from fraudulent confusion of general and particular, that the improbable is probable, and vice versa.[28]

Aristotle's invalid topics could be interpreted as principles of action for commonplaces—places of memory and places of invention—where the arguments are derived from places that are unrepresentative and indeterminate. The challenges of indeterminacy that might lead inquiry in the wrong direction are highly present in any research field, including design. For example, if human behavior is coherent with some changes that appear *by chance*, conclusions derived should be treated carefully because ambiguous situations may appear. "By chance" refers to the possibility of taking the accidental as essential, or of using a single, unrepresentative example. If we make a statement about the whole that is true only of individual parts, we also might confuse general and particular, that the improbable is probable, and vice versa. Thus, it adds to the challenge of which situation may be regarded as unstable, since a situation formerly regarded as unstable may now be regarded as stable, and vice versa.

These and other examples of fallacies of arguments bring us to the realization that a clear strategic approach is needed in inquiry to address the complexities that often are characterized by controversies and ambiguities in real life scenarios.

That leads us back to reflect on the commonplaces of arguments, where *places of invention* are significant in the process of invention for exploration of the unknown as a beginning point of discovery. Since Aristotle's *invalid* topics could be interpreted as principles of action, they can be called the internal principles of functioning in the sense that they are both beginnings and ends in the process of reasoning, where meanings are discovered in interpretation of existential acts.[29] However, the essential definitions and the material discovered don't lead in this case to a fully formed idea, since the activity or functioning that comes into existence is invalid.

Deeper reflection on *topics*, supported by applicable theories, is important since it helps to determine places for discovery. Therefore, discovery of topics relevant in commonplaces is an initial step in determining the aspects for observation. A deeper analysis is embedded in the process of discovering the arguments in the places *proper* for a subject matter in question. Topics like *action*, as a commonplace for discovery, should carefully be explored in the places of invention as an aspect of experience in discovering issues by using appropriate methods and supporting theories.

28 See *The Basic Works of Aristotle*. 1941.

29 Different methods also require principles to function in different ways, as be powers of humans, determine consequences, unify the opposites or order organic wholes.

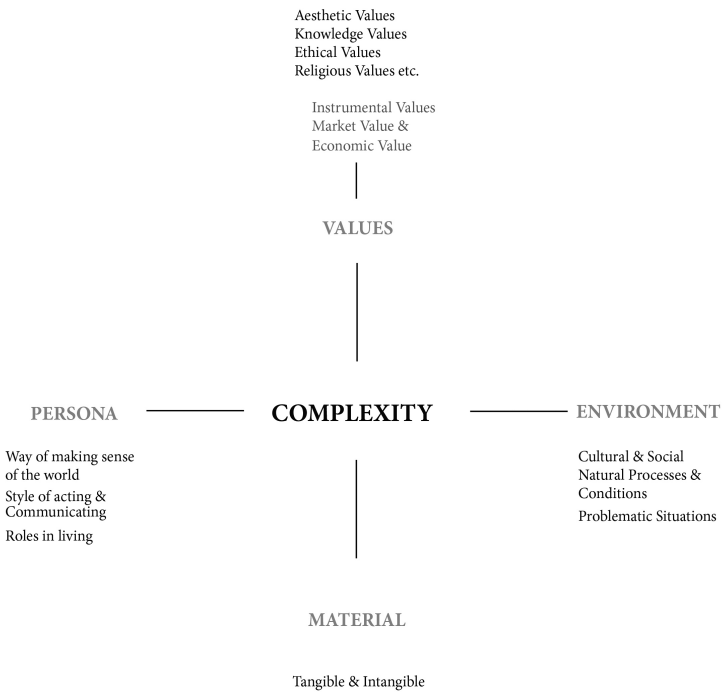

Figure 4
Complexity Diagram. © Kaja Tooming Buchanan, 2014.

Action, that refers to practical doing if we use Dewey's vocabulary, was one of the central concepts for R. G. Collingwood in understanding the relationship between theory and practice.[30] Dewey developed his own theory of interaction, where *actions* for him signified a *practical* experience as one aspect of experience in a unified experience.[31] While Dewey distinguished between kinds of experiences and focused on the wholeness of *experience*, Collingwood gave prominence to *action* itself as a unified concept. Collingwood notably called attention to problems concerned with action, but not with action that was merely a physical activity, nor merely moral, political, or economic action. Instead, he emphasized that every action was moral, political, and economic.

The interdependence shown between theory and practice here highlights the epistemic flux of knowing that reflects back to the reality of the perceived world with all its related actions and functionings, which elements are perceived in all their concrete variety and particularity. Collingwood asserts, "If you change the moral, political, and economic 'theories' generally accepted by the society in which he lives, you change the character of his world; and that if you change his own 'theories' you change his relation to the world."[32] He concludes that in either case you change the ways in which the person acts.

30 R.G. Collingwood. *An Autobiography*. Oxford: Oxford University Press, The Clarendon Press, 1939. Reprinted 1967.

31 See John Dewey, *Art as Experience*. New York: Capricorn Books, 1958.

32 Collingwood, 1967, 147.

This adds to the challenge, where roles in living and ways of acting and communicating depend not only on cultural and social processes in the complex environment where we live, but also depend on the *value judgment* that a person makes.[33] In its own turn, this judgment based on reasoning affects peoples' ways of acting and making sense of the world. The change or unchange in this case is triggered by our actions, but not by actions that are separated from our thoughts; instead by actions, which are initiated by some internal or external cause and influenced by *knowing* or *unknowing* what the underlying principles for *being* and human action are that shape the character of this world and our relation to it.

In his poem "East Coker," T. S. Eliot wrote two famous lines: *in my beginning is my end*, and *in my end is my beginning*—where *being* in the world is reflected in an inner dialogue, but manifests thoughts that relate to all humanity.[34] The struggle, characterized both by change and unchange, is timeless, but at the same time refers back to the particular moment in history seen by the eyes of one individual, but reflected to many. As an illustration, toward the end of the poem, Eliot generalizes one individual's *being* in the world with the following reflection:

> Old men ought to be explorers
> Here and there does not matter
> We must be still and still moving
> Into another intensity
> For a further union, a deeper communion
> Through the dark cold and the empty desolation,
> The wave cry, the wind cry, the vast waters
> Of the petrel and the porpoise. In my end is my beginning.[35]

"In my end is my beginning" is ambiguous and leaves the question open for interpretation. "In my beginning is my end" is equally ambiguous for interpretation and understanding. Everything that comes between these two meanings of existence, however, might reduce or might increase the ambiguity. It depends not only on how the judgments are made, but also on how the exploration of the known and unknown—by using *places of memory* and *places of invention*—leads to new understanding and new discoveries about the complexity of *being* and making sense of the world that manifests in cultural and social processes and in values that we share.

If we relate the meaning that the phrase "in my end is my beginning" brings to the (design) research process, and assume that the word *end* designates the meaning of the term *problem* that is not an end, but is the beginning of an end in the research inquiry; it is the end in the sense that it carries the significance of *knowing* what

33 See Figure 4. *Complexity* Diagram. Kaja Tooming Buchanan, 2014.

34 T. S. Eliot, "Four Quartets," in *The Complete Poems and Plays 1909-1950*. New York: Harcourt, Brace & World, Inc. Reprinted 1962, page 123 and 129.

35 Eliot, "Four Quartets." 1962, p. 129.

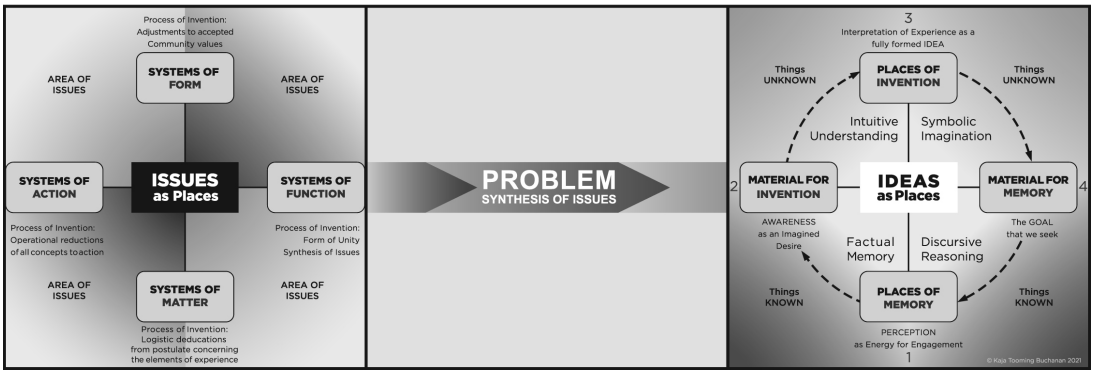

Figure 5
Unified Model: From Issues to Ideas. © Kaja Tooming Buchanan, 2021.

the problem is in order to move on to new discoveries—to discoveries of unknown that are manifested in new ideas by addressing the problem.[36]

The discovery process of problem finding is wrapped up in many challenges and paved with ambiguities that obstruct the exploration of the unknown. Therefore, we need a strategy that helps to overcome the challenges we face in the exploratory research phase in discovering issues in problematic situations that finally leads to the problem itself. That strategy is *Issue Mapping Strategy*, since it helps to avoid speculative conclusions and hypothetical answers, which are not evidence-based. Judgments, if derived from *invalid topics*, that is to say from fallacies of arguments, can lead inquiry to wrong direction if not addressed properly by using methods relevant and needed in invention to determine the proper places for discovery.

Process and Places for Discovery in the *Issue Mapping Strategy*

The significance of problem finding in the process of discovery, its meaning as well as the challenges faced, are discussed in the previous pages. For a deeper understanding of the strategy that is highly useful in analyzing complex, indeterminate situations, I now discuss in more detail the *Issue Mapping Strategy*, its structure, places for discovery, and the process of reasoning.

There are many variations of cognitive mappings that address problematic situations which are characterized by uncertainties, ambiguities, and controversies in human experience.[37] They vary in their purposes, methods used, interpretations made, and principles attached. Many of them, however, are speculative or hypothetical and may lead an inquiry down the wrong track. Being speculative or hypothetical, however, does not necessarily mean that their value is diminished in the process of discovery—

36 See Figure 5. *Unified Model: From Issues to Ideas.* Kaja Tooming Buchanan, 2021.

37 They differ in character and purpose from the Issue Mapping Strategy. For example, *gigamapping*, developed by Birger Sevaldson and *controversy mapping*, which is discussed in T. Venturini, D. Ricci, M. Mauri, L. Kimbell and A. Meunier's article "Designing Controversies and their Publics" in *Design Issues*, Volume 31, Issue 3, Summer 2015.

as long as their purpose *is* to highlight the hypothetical character of exploring possible places for future discovery.[38] However, the relevance of these variations in mapping is questionable and they raise concerns if the outcomes from the process are taken as valid, where conclusions are based on non-evidence, insufficient evidence, or based on information that is derived from invalid topics—that is fallacies of arguments—and are highly speculative and invalid. The Issue Mapping Strategy contrasts with this kind of speculative approach in research, since its ultimate goal is the discovery of a central problem based on evidence.

The Issue Mapping Strategy is characterized by the *method of inquiry*. The goal is the discovery of issues and the advancement of knowledge that interplays with theories, where the meanings are explored in concrete situations as a result of analyses of problematic situations by using a plurality of methods.[39] Particularly, this method could be described as an overall *problematic* method, since its validity resides in the reciprocal determination of the parts by the whole and the whole by its parts. In this case, the central problem signifies a unified whole, where the elements of the whole are indeterminate until they are discovered and organized by the method. Thus, what is initially indeterminate becomes an organized whole when the strategy unites data and materials on the one hand with conceptions and forms on the other.

The first early attempts, at devising Issue Maps, had their starting point in theories that helped to understand investigated phenomena in user experience in their contextual belonging to problematic situations.[40] Their significance was in highlighting the need for a unified strategy, since the successful outcome depended on it.

The first map that tried to capture the wholeness of the reasoning process in problem finding was developed for the Louis Stokes VA Medical Center in Cleveland in 2014.[41]

The wholeness approach to problem finding and its visualization had great value since it gave access to the entire research process from basic data collection to the final problem statement, where phenomenological observation was used as a main research method. It clearly showed the need for an evidence-based discovery process of problem finding, since it gave sponsors an opportunity to address issues that they did not even know existed.

38 For example, *Gigamapping*, more widely used in Europe, is hypothetical, since its process focuses on possible places for discovery, but does not necessarily relay on evidence.

39 For the "method of inquiry," see Richard McKeon, "Philosophy and Method," in *Selected Writings of Richard McKeon: Volume 1, Philosophy, Science and Culture*. Ed. by Zahava K. McKeon and William G. Swenson. Chicago: The University of Chicago Press, 1998.

40 We developed several of these maps for sponsors like the City of Cleveland, the Cleveland Museum of Art, and the Louis Stokes VA Medical Center in the *Design as Entrepreneurship* course led by the author at the Cleveland Institute of Art (CIA).

41 See Figure 6. Issue Map for the Louis Stokes VA Medical Center in Cleveland. This project and the Issue Map were developed under my guidance by Chris Ramos, Rob Williams, Evan Snyder, Amber Albergottie, Will Strachan and Chadd Dymond. The final visualization is by Chris Ramos. The image in Figure 6 is for representational purposes only. It represents only the schematic structure, because the map's original size is three meters high.

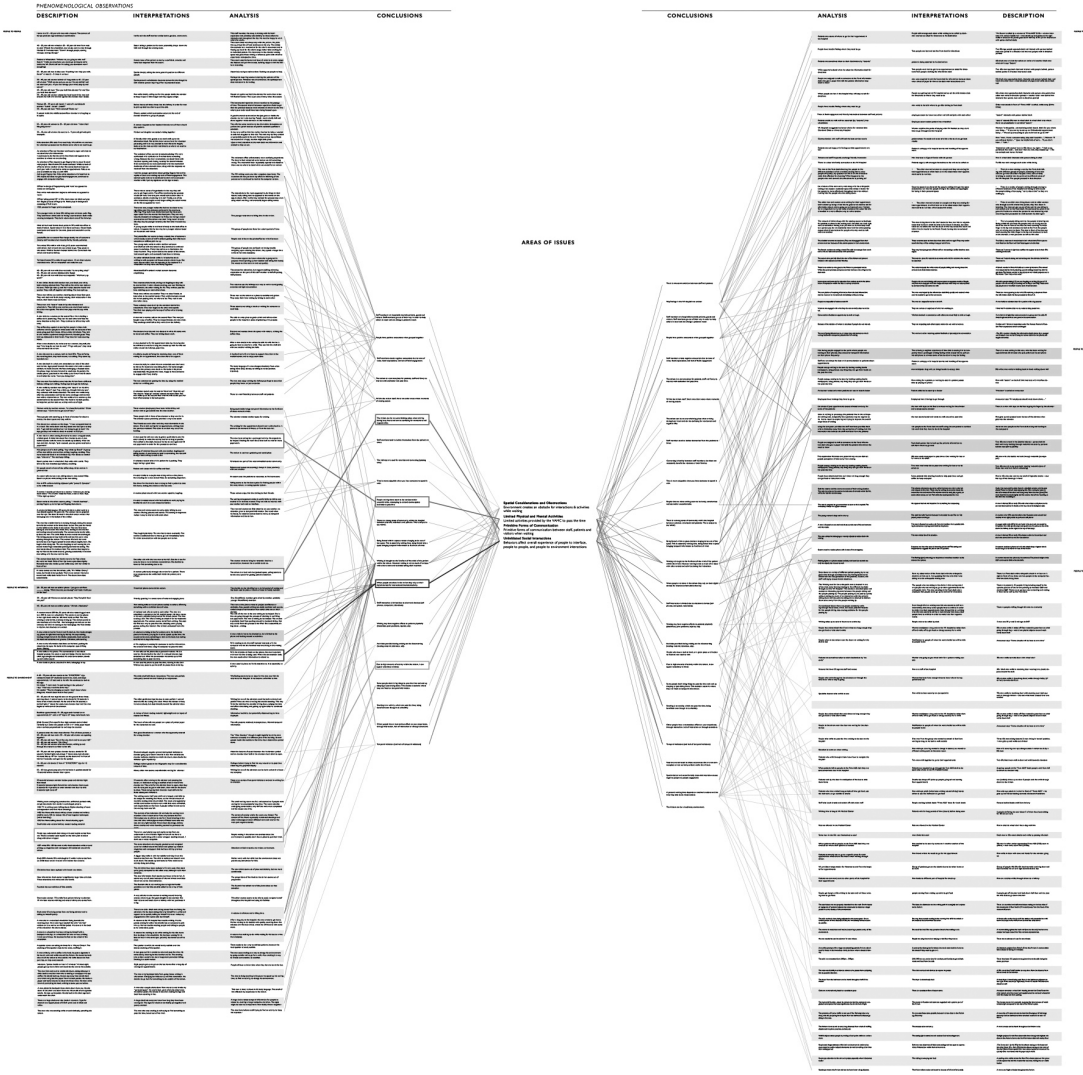

Figure 6
Issue Map for the Louis Stokes VA Medical Center in Cleveland, 2014. Visualization by Chris Ramos.

This map later became a general prototype for future Issue Maps.[42] Although the organizing principle for the main structure remains the same, its exploratory process of problem finding has developed in more advanced ways over time and is more complex in its expression.[43]

42 The Issue Maps have been developed under my guidance over more than a decade.

43 See Figure 7. The Issue Map developed for the Siping Jing Lao Yuan Nursing home in Shanghai 2017 under my guidance by Helena Stening, Li Man, Yan Bingyi and Zhao Yuanxing. This image here represents only the schematic structure, since the original size of this map is very large.

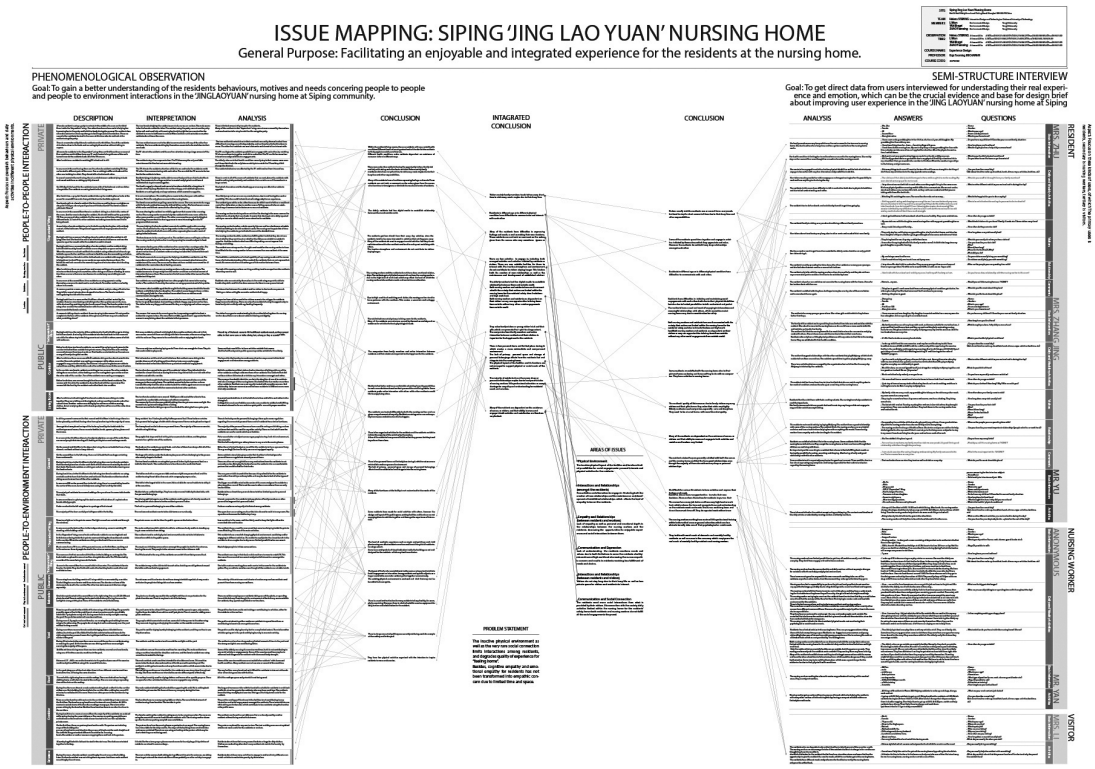

Figure 7
Issue Map for the Siping Jing Lao Yuan Nursing Home, 2017.

The first sketches of issue maps are often quite messy and several iterations are needed to complete the analyses of the unfolding discovery process that culminates with the problem statement.[44] Therefore, a well-formulated goal that reflects the general purpose of the entire project is important for the process of Issue Mapping.

Each method conducted in the Issue Mapping Strategy has its own objective. In interplay with theories, these methods help to identify the places for issues and analyze their pertinence to problematic situations. There is a crucial moment in the process of analyses in the strategy of Issue Mapping when the researcher needs to keep asking the question why—*why is it an issue?*—to open up the investigation to a variety of interpretations in understanding the phenomena in question. That question turns the method, that otherwise operates only exclusively as *a* method, into an Issue Mapping strategy.

Identifying the kinds of theories that are relevant depends on the *topic* for research and its understanding in the context of both a given challenge and the purpose for the exploration. The kinds of methods being used will depend on an interpretation of a given situation and the approach needed for an investigation of the questions asked.

The number of methods used in Issue Mapping can vary, depending on the character of the inquiry and its purpose. The main methods employed are *qualitative* research methods, where

44 See Figure 8. Unfolding Discovery Process of Issue Mapping Development.

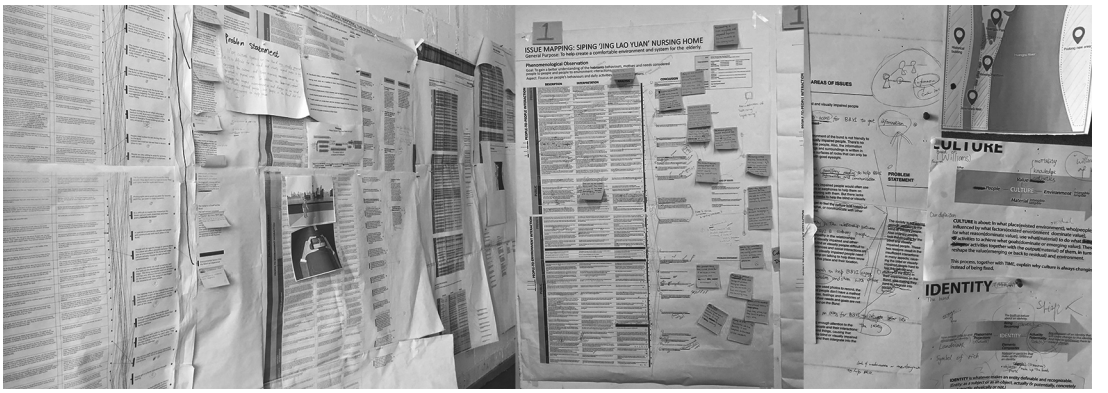

Figure 8
Unfolding Discovery Process of Issue Mapping Development. Photo by Kaja Tooming Buchanan.

data is collected in the form of words and observations, and analysis is based on the interpretation of these data.[45] Qualitative research methods, such as *phenomenological observations*, *interviews*, *role-play*, and others, are often used in interplay with quantitative research methods that provide additional information needed about user statistics or scientific measurements. Phenomenological observations, instead of ethnographic, are used in the Issue Mapping process, since they don't require long-term residence in the cultural settings, and even more importantly, the *second* and *third* level of interpretations that are characteristic in ethnographic research are avoided.[46]

These methods under the umbrella of the Issue Mapping Strategy help after careful analysis to identify the places of issues with a further identification of specific issues and their relationships to broader areas of concern.[47] Thus, *synthesis*, based on the analysis of all issues, finally leads to the *central problem*.[48] As discussed before, the central problem is a starting point for a new discovery, a discovery of ideas, which are manifested both in the *process*, and in the *product of invention*.[49]

Since we deal with indeterminate situations, we first need to discover *commonplaces* of arguments to determine places for issues. Therefore, the next important step is to focus on the exploration of the unknown that is found in commonplaces. Since commonplaces are *topics* that are relevant for all subject matters, they provide material for invention and memory and are *places* by which arguments about the unknown are discovered. Whether something has happened or will happen characterizes the essence of commonplaces. This notion leads us to discussion of the meaning of *proper* places, which are proper to a particular subject matter—that is, specific issues that could be identified in commonplaces.[50] Aristotle distinguished three areas of proper places: subject about the future, judging the past, and expression of the present. For designers and design researchers, research starts with understanding the present by judging the past in order to predict the future.

45 For example, *Role Play* focuses on exploration from the perspective of a particular user, who is observed in the specific social and cultural settings and often in the physical environment. Role-play was used, for example, in our project that focused on the blind and the visually impaired people's experience in Shanghai.

46 For ethnographic research, see Peggy Reeves Sanday, "The Ethnographic Paradigm(s). In *Administrative Science Quarterly*. Volume 24, Number. 4. Qualitative Methodology. Sage Publications, 1979. See also Clifford Geertz, *The Interpretation of Cultures*. New York: Basic Books, 1973.

47 See Figure 9. *General Structure of Issue Mapping*. Kaja Tooming Buchanan, 2021.

48 See definition of the *central problem* on page 6.

49 See Figure 5 on page 13.

50 See Figure 3 on page 9.

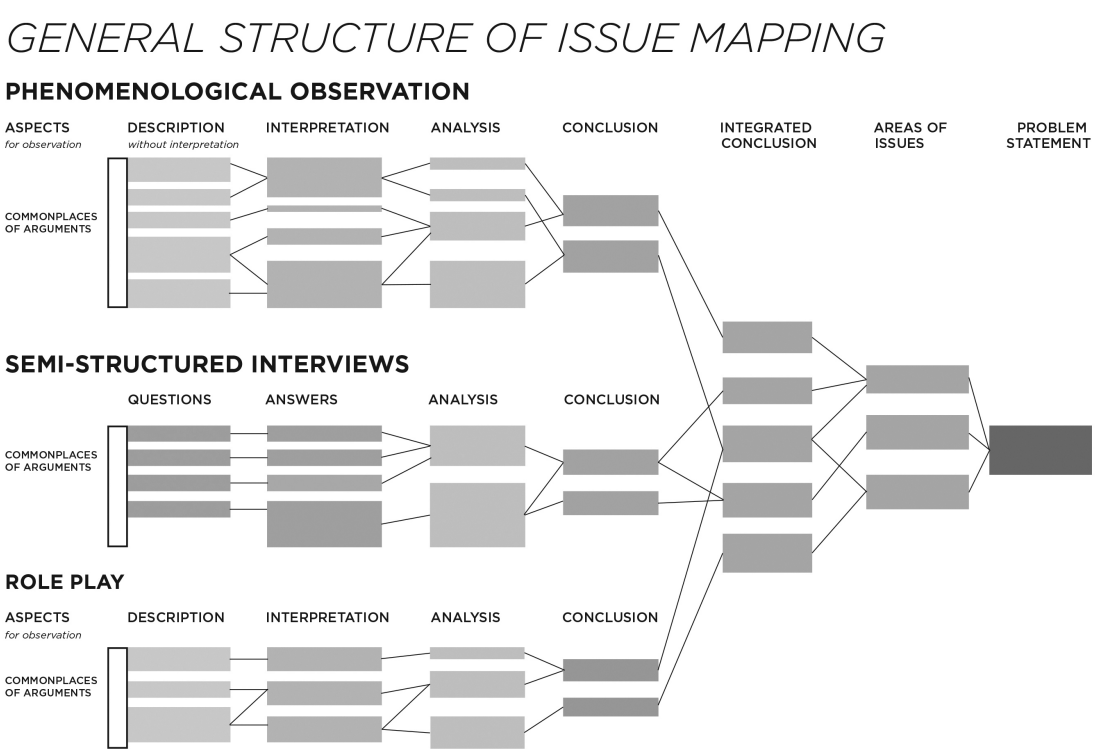

Figure 9
General Structure of Issue Mapping. © Kaja Tooming Buchanan, 2021.

Thus, everything perceived, discovered, or explained also needs to be observed in the context of *time*. Not necessarily the aspect of time, which is measurable, but time that is *qualitative* in its nature and experienced in the social and cultural settings of user experience. For example, the project for the Louis Stokes VA Medical Center focused on the qualitative aspect of waiting time in the hospital setting. In turn, the project that focused on the Jing Lao Yuan nursing home in Shanghai addressed new residents' difficulty in adapting to and being integrated into their new "home" in a new social and cultural environment.[51]

Thus, it also relates to *culture*, but not to the culture seen from a narrow perspective of present time, but from a perspective that highlights the interdependence of past, present, and future. Raymond Williams, for example, understands the culture as a whole, but points out three aspects of culture, that is, *residual*, *dominant*, and *emergent*.[52] These three features of culture melting into each other with various degrees of dominance and are interdependent of each other in relation to the meaning of culture itself and the context of time that reflects the past, is experienced in the present, and influences the future. This mutual interdependence of understanding the culture in the context of time also echoes in T. S. Eliot's reflection on time when he writes, "Time present and time past are both perhaps present in time future, and time future contained in the past."[53] He continues, "if all time is eternally present all time is

51 This project was led by the author in the *Experience Design* course at Tongji University in 2017.

52 See Raymond Williams, "Dominant, Residual, and Emergent." In *Marxism and Literature*. Oxford, 1977.

53 T.S. Eliot, "Burnt Norton" in *Four Quartets*, 1962, 117.

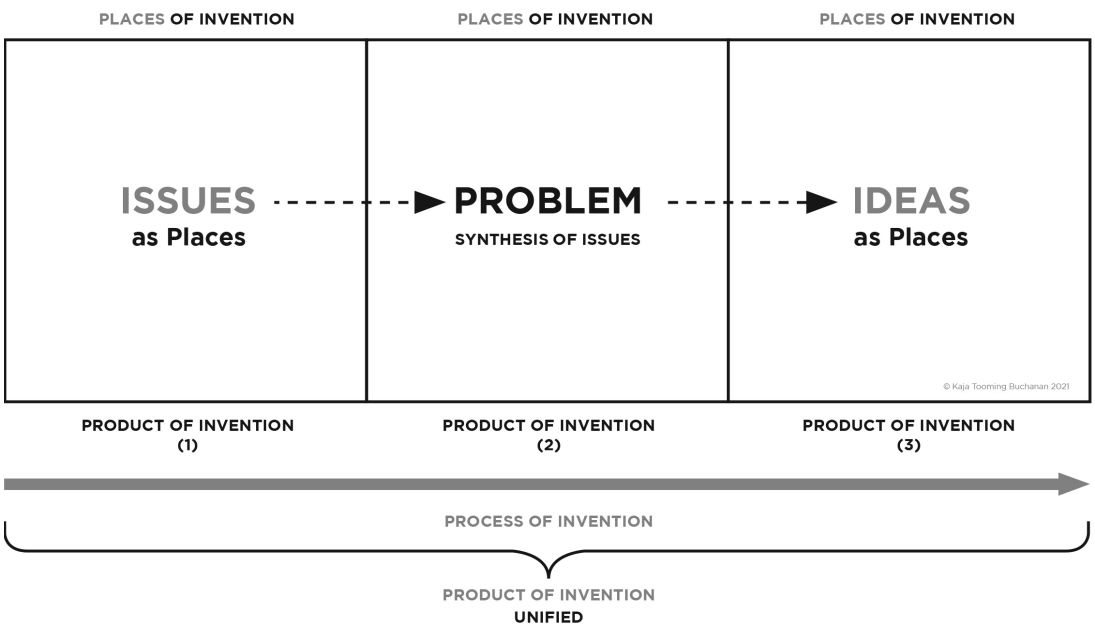

Figure 10
3P-Invention Model – Places, Process and Product of Invention. © Kaja Tooming Buchanan, 2021.

unredeemable." This ambiguous notion that tries to capture all *being*, reflects the existence of time that reaches beyond the existential reality to emphasize the reality of all.

Time, *being*, and *culture* are *topics* that are central in understanding human experience in problematic situations with interdependency of the past, present, and future, where the subject of future depends on the expression of the present that is judged by its past.

These and other examples bring us back to the discussion and significance of discovering commonplaces of arguments that help to identify issues in problematic situations. The Issue Mapping Strategy was used and is useful in all of the cases mentioned to understand indeterminate, problematic situations and to overcome ambiguities in complex environments.

Final Discussion of Design (Process) Fallacies

Finally, I would like to come back to a few major points and highlight three areas of concern where the risk for design process fallacies is greatest. These three areas of concern are *places of invention*, *process of invention*, and *product of invention*.[54]

In the first area of concern—*places of invention*—the focus is on *topics*, that is, commonplaces of arguments that determine the places for discovery of the unknown. The unknown refers back to the places that may be ambiguous, uncertain, and full of conflicts and contradictions. In the second area of concern—*process of invention*—the focus is on the process of discovery in the reasoning

54 See Figure 10. *3P-Invention Model – Places, Process and Product of Invention.* Kaja Tooming Buchanan, 2021.

process of Issue Mapping Strategy, where integration of knowledge is gained in interplay of theory and methods. In the third area of concern—*product of invention*—the focus is on *synthesis* as outcome, that is, the *product of invention* derived from exploratory research in purpose to formulate a central problem based on evidence. The significance of this *product* is that it is a starting point for a new discovery—discovery of the unknown that culminates in a new *product of invention*, that is—ideas. There also is a final product of invention that captures the entire process of invention from the exploratory phase to the generative, where the product is manifested in embodiment of ideas, which finally after careful evaluation leads to the implementation of the product itself.

Numerous concept maps have been developed for the discovery of places for exploration of topics relevant to investigation of the subject matter in question for ongoing research. As discussed before, the *commonplaces* of arguments, with the interplay of *memory* and *invention*, are the basis for the *process of invention* that finally culminates in the *product of invention* itself. Thus, places for discovery need to be relevant to the questions asked and the purpose stated in the problem finding process of inquiry; and *places* of invention must be formulated appropriate to the kinds of issues without anticipating answers in advance. This is why in the Issue Mapping Strategy the focus in the first step is on discovery of commonplaces of arguments for perception, discovery, and the explanation of the unknown. If the process is thoughtfully conducted in an interplay with relevant theories about the topics of interest, then *invalid* topics, such as *ignore crucial circumstances*, *take accidental as essential*, *argue from consequence*, or *use a single, unrepresentative example*, and others, are avoided.

That leads us back to the main point of the argument that the success of an inquiry depends on its clear strategic approach and its discovery process. Learning what the genuine problem is depends on the researcher, who needs to explore places relevant about the things unknown that finally manifest in the products of invention. Knowing, thus, depends on the process of reasoning by which arguments about the unknown are discovered. In the end of the conversation about the nature of knowledge, Socrates tells Theaetetus that "the argument has served them even though they reached no conclusion, because they have learned through it not to think they know when they do not."[55]

Acknowledgment

This article is dedicated to all my students from the United States, Europe, and China who for more than a decade have followed my journey to develop the Issue Mapping Strategy, helped to bring it to practice, and urged me to write this article.

55 See *The Collected Dialogues of Plato*, 1964.