Heads up! **If you want to bring a published theory to use in this workshop, please clear it with the presenter in advance by email.**

Knowledge Mapping for Literature Reviews: A Science of Conceptual Systems Approach

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https://askmatt.solutions/

Here, you will find:

- Handouts for workshop activities
- Reading lists for after the workshop
- Links to videos
- Online mapping resources
- The basics of IPA
- Professor’s tip sheet for knowledge mapping in the classroom
- Presentation slides

Activity #1 Sample Theory for Knowledge Mapping

Discuss in groups, with each individual creating a map of concepts (in circles) and causal connections (with arrows) from this theory (or use one that you have brought with you).

Source: Duit, A., & Galaz, V. (2008). Governance and complexity—emerging issues for governance theory. Governance, 21(3), 311-335.

First, CAS consists of agents (e.g., cells, species, social actors, firms, and nations) assumed to follow certain behavioral schemata. Second, as no central control directs the behavior of agents, self-organization occurs when agents are acting on locally available information about the behavior of other nearby agents. As a result of this, co-evolutionary processes driven by agents' attempts to increase individual fit gives rise to temporary and unstable equilibriums, which in turn generate the shifting system behavior with limited predictability (often denoted emergent properties) associated with CAS.

Alternative theory for mapping: Source: Gatrell, A. C. (2005). Complexity theory and geographies of health: a critical assessment. Social Science & Medicine, 60(12), 2661-2671.

In essence, a system displays complex behaviour when its elements interact in a non-linear fashion, such that it is impossible to predict the behaviour of the system as a whole from knowledge of the elements themselves. I focus on four key aspects of CT that are embedded in Table 1: *relations and networks; non-linearity; emergence;* and *hybrids*.

Table 1
The main features of complex systems (partly based on Cilliers, 1998)

Characteristics of complex systems	Example (health related)
Large number of elements, interacting dynamically (via flows of material or information) across *networks*	A population in which people influence each others' health-related behaviour, or transmit infections among each other
Interaction is rich and may involve both human and non-human agents (*hybrids*) or elements	People interact with other agents and organisations (health-care providers; health-promoting and health-denying activities and facilities)
Interactions may be short range but the richness of interactions or *relations* across networks means that 'influence' can be wide ranging	'Friction of distance' implies interactions tend to be local, but time-space compression means that interactions having health consequences can be 'at a distance'
Each element is 'ignorant' of the behaviour of the system as a whole; therefore, we cannot understand the system by 'summing' or 'averaging' the behaviour of individual components; system-wide properties *emerge*	One is generally ignorant of the possible system-wide consequences of one's health-related behaviour; the 'public health' is more than the sum of individual disease profiles
Interactions are *non-linear* (which also implies that small causes have large results). There are feedback loops, of varying kinds	Disease outbreaks that are highly localised can spawn epidemics or even pandemics
Complex systems are open systems, interacting with environment	The health system is only closed at a global level, and even then it is open if we consider global environmental change
Complex systems are far from equilibrium	Population growth and movement ensures that the system is never fully stable
Complex systems have a history; their past is 'co-responsible' for their present behaviour	Migration, history of inequalities

Alternative theory for mapping: Source: Rousseau, David. (2017). Systems research and the quest for scientific systems principles. *Systems,* 5(2), 25. From: Derek K. Hitchins (1992). *Putting Systems to Work* (pp. 60–71).

1. Principle of Reactions: If a set of interacting systems is at equilibrium and, either a new system is introduced to the set, or one of the systems or interconnections undergoes change then, in so far as they are able, the other systems will rearrange themselves so as to oppose the change.

2. Principle of Cohesion: A system's form is maintained by a balance, static or dynamic, between cohesive and dispersive influences. The form of an interacting set of systems is similarly maintained.

3. Principle of Adaptation: For continued system cohesion, the mean rate of system adaptation must equal or exceed the mean rate of change of environment

4. Principle of Connected Variety: Interacting systems stability increases with variety, and with the degree of connectivity of that variety within the environment.

5. Principle of Limited Variety: Variety in interacting systems is limited by the available space and the minimum degree of differentiation

6. Principle of Preferred Patterns: The probability that interacting systems will adopt locally stable configurations increases both with the variety of systems and with their connectivity.

7. Principle of Cyclic progression: Interconnected systems driven by an external energy source will tend to a cyclic progression in which system variety is generated, dominance emerges to suppress the variety, the dominant mode decays or collapses, and survivors emerge to regenerate variety.

Activity #2 Synthesizing Knowledge Maps

Using the maps you created in Activity #1, identify concepts in common between two maps and synthesize them to create a new knowledge map.

Draw it here… if you like… or use some other creative method for synthesizing them!

Activity #3 Clarifying your Research Question

Identify one or more concepts on your map that are NOT well-explained.

Identify one or more gaps between concepts where primary research (or secondary) might be done to improve the structure of the knowledge map.

Use this space to write your ideas for research:

Activity #4 Evaluating Your Causal Knowledge Map

We might get to this… if we have time. Otherwise, you can do this exercise on your own and/or in collaboration with others.

Use this worksheet to quantitatively and qualitatively assess your causal knowledge map to develop recommendations for action and for future research.

1. Number of concepts (circles) in map: _________ (this is the simple complexity)

2. Number of concepts with more than one arrow pointing to them (the number o f concatenated or transformative concepts): ______________

3. Calculate the systemic structure "Systemicity" (or Depth)

(your answer to #2 divided by your answer to #1)*100 = _________%

(this is the internal coherence of the theory)

For another dimension of the value of your theory…

In the first column, write each concept.

In the second column, write how you will measure it.

Name of Concept	How it is Measured	

Calculate the percentage of concepts in your theory that are measurable. This helps to show how testable/falsifiable your theory is.

Reading List
Integrative Propositional Analysis
& Causal Knowledge Mapping

Integrative Propositional Analysis (IPA) is a method for integrating, evaluating, and improving theories, models, policies, programs, and laws based on the structure of the understanding (explanation, logic) behind them. It is part of a broader set of techniques for causal knowledge mapping, visualizing understandings of complex cause-and-effect relationships that are important to understanding and addressing an issue. The reading materials below detail the academic research behind IPA, examples of how it is applied software/tools for creating maps, tools for assessing the quality of evidence across methods and disciplines, and more.

* Publications marked with "*" are freely available at the links below. The other publications may require a fee to access. If you are affiliated with a university, you may be able to access these at no charge through your institution's library.

A few key resources:

A good overview of the field:

Wallis, S. E. (2016). The science of conceptual systems: A progress report. *Foundations of Science*, 21(4), 579–602. https://link.springer.com/article/10.1007/s10699-015-9425-z

Using knowledge mapping in the classroom for evaluating and accelerating learning:

Goltz, S. M. (2017). Enhancing Simulation Learning With Team Mental Model Mapping. Management Teaching Review, 2379298117706335. http://journals.sagepub.com/doi/abs/10.1177/2379298117706335

Knowledge mapping for synthesizing interdisciplinary theories and supporting computer modeling:

* Wallis, S. E., & Johnson, L. (2018). Using Integrative Propositional Analysis to Understand and Integrate Four Theories of Social Power Systems. Journal on Policy and Complex Systems, 4(1), 169-194. http://www.ipsonet.org/publications/open-access/policy-and-complex-systems/policy-and-complex-systems-volume-4-number-1-spring-2018

Award-winning paper for using a gamified process of causal knowledge mapping for clients and in the classroom:

* Wallis, S. E., & Wright, B. (2015). Strategic Knowledge Mapping: The Co-creation of Useful Knowledge. Paper presented at the Association for Business Simulation and Experiential Learning (ABSEL) 42nd annual conference, Las Vegas, CA. https://journals.tdl.org/absel/index.php/absel/article/view/2899/2850

Academic Research behind Integrative Propositional Analysis

Wallis, S. E. (2016). The science of conceptual systems: A progress report. *Foundations of Science*, 21(4), 579–602. http://link.springer.com/article/10.1007/s10699-015-9425-z

Wallis, S. (2015). Structures of logic in policy and theory: Identifying sub-systemic bricks for investigating, building, and understanding conceptual systems. *Foundations of Science*, 20 (3), 213-231. http://link.springer.com/article/10.1007/s10699-014-9360-4

Wallis, S. (2014). Abstraction and insight: Building better conceptual systems to support more effective social change. *Foundations of Science*. 19 (4), 353-362. http://link.springer.com/article/10.1007/s10699-014-9344-4

Wallis, S. (2014). Evaluating explanations through their conceptual structures. Chapter in *Modes of Explanation: Affordances for Action and Prediction*. (M. Lissack & A. Graber, Eds.). Palgrave MacMillan. http://link.springer.com/chapter/10.1057%2F9781137403865_15

White Papers on Integrative Propositional Analysis & Knowledge Mapping

* Wallis, S.E. & Wright, B. (September, 2014). *Strategic Planning 3.0*. Meaningful Evidence, LLC. http://meaningfulevidence.com/wp-content/uploads/2014/12/Strategic-Planning-3.0-October-27.pdf

* Wallis, S.E. & Wright, B. (September, 2014). *The Science of Conceptual Systems: Its History and Usefulness for Improved Decision-Making and Organizational Success*. Meaningful Evidence, LLC. http://meaningfulevidence.com/wp-content/uploads/science_of_conceptual_systems1.pdf

* Wallis, S.E. & Wright, B. *Strategic Knowledge Mapping for Improved Policy and Strategic Planning*. White paper. Explains why previous approaches to strategic planning have failed and how to create a more effective map using innovative approaches. http://meaningfulevidence.com/wp-content/uploads/Strategic-Knowledge-Mapping-Oct-271.pdf

Instructions on How to Apply IPA

* Wallis, S.E. (2015) *Basics of IPA*. Leibniz Institute of Agricultural Development in Transition Economies/Fulbright Specialist Program. http://meaningfulevidence.com/wp-content/uploads/Basics-of-IPA.pdf

* Wallis, S.E. & Wright, B. (September, 2014). *Strategic Knowledge Mapping for Improved Policy and Strategic Planning*. Meaningful Evidence, LLC. http://meaningfulevidence.com/wp-content/uploads/Strategic-Knowledge-Mapping-Oct-271.pdf

A Few of the Many Studies Applying Integrative Propositional Analysis

Panetti, E., Parmentola, A., Wallis, S. E., & Ferretti, M. (2018). What drives technology transitions? An integration of different approaches within transition studies. Technology Analysis & Strategic Management, (online), 1-22. doi:10.1080/09537325.2018.1433295

Shackelford, C. (2014). Propositional Analysis, Policy Creation, and Complex Environments in the United States' 2009 Afghanistan-Pakistan Policy. (Doctoral Dissertation), Walden, Minneapolis, MN.

Wallis, S. E., & Johnson, L. (2018). Using Integrative Propositional Analysis to Understand and Integrate Four Theories of Social Power Systems. Journal on Policy and Complex Systems, 4(1), 169-194.

Wallis, S. E., & Wright, B. (2016). Integrative Propositional Analysis: The missing Link for Creating More Effective Laws. Science of Laws Journal, 2(1), 10-15.

* Wallis S., Wright B. (2016). Integrative Propositional Analysis: The Missing Link for Creating More Effective Laws. *The Science of Laws Journal*, 2, 10-15. http://www.scienceoflaws.org/common/getfile.aspx/492928

* Wright, B. & Wallis, S.E. (2015). Using Integrative Propositional Analysis for Evaluating Entrepreneurship Theories. *SAGE Open*, 5(3). http://sgo.sagepub.com/content/5/3/2158244015604190

* Wallis, S. (2015). Are theories of conflict improving? Using propositional analysis to determine the structure of conflict theories over the course of a century. *E:CO – Emergence: Complexity and Organizations*. 17(4). https://journal.emergentpublications.com/article/are-theories-of-conflict-improving/

* Wallis, S. (2013). How to Choose Between Policy Proposals: A Simple Tool Based on Systems Thinking and Complexity Theory. *E:CO – Emergence: Complexity and Organizations*, 15(3). https://journal.emergentpublications.com/article/are-theories-of-conflict-improving

Wallis, S. (2011). *Avoiding Policy Failure: A Workable Approach*. Litchfield Park, AZ: Emergent Publications, ISBN: 978-0-9842165-0-5.

Wallis, S. (2010). Developing effective ethics for effective behavior. *Social Responsibility Journal*, 6 (4). http://www.emeraldinsight.com/doi/pdfplus/10.1108/17471111011083428

* Wallis, S. (2010). Toward the development of more robust policy models. *Integral Review*, 6 (1), 153-177. http://www.integral-review.org/issues/vol_6_no_1_wallis_toward_the_development_of_more_robust_policy_models.pdf

* Houston, D., Wright, B., & Wallis, S.E. Re-Structuring Evaluation Findings into Useful Knowledge, *Journal of MultiDisciplinary Evaluation (JMDE)*, September, 2017. http://journals.sfu.ca/jmde/index.php/jmde_1/article/view/481

Some deeper, more philosophical papers about knowledge and the impact of the SOCS perspective

Wallis, S. E., & Valentinov, V. (2016). The imperviance of conceptual systems: Cognitive and moral aspects. Kybernetes, 45(9).

Wallis, S. E., & Valentinov, V. (2016). A limit to our thinking and some unanticipated moral consequences: A science of conceptual systems perspective with some potential solutions. Systemic Practice and Action Research, 30(2), 103-116.

Wallis, S. E., & Valentinov, V. (2017). What Is Sustainable Theory? A Luhmannian Perspective on the Science of Conceptual Systems. Foundations of Science, 22(4), 733-747. doi:10.1007/s10699-016-9496-5

Tools for Assessing the Quality of Research across Methods and Disciplines

* Belcher, B.M., Rasmussen, K.E., Kemshaw, M.R., & Zornes, D.A. (2016). Defining and assessing research quality in a transdisciplinary context. *Research Evaluation* 25 (2016), 1-17. http://rev.oxfordjournals.org/content/25/1/1.full

* Lynn, J. & Preskill, H. (January 2016). *Rethinking rigor: Increasing credibility and use*. http://fsg.org/tools-and-resources/rethinking-rigor

* Wallis SE. (2008) Validation of theory: Exploring and reframing Popper's worlds. *Integral Review* 4(2): 71-91. http://integral-review.org/documents/Wallis,%20Validation%20of%20Theory,%20Vol.%204%20No.%202.pdf

* Wright, B. & Wallis, S.W. How good is your evidence? *Stanford Social Innovation Review* (online article). Mar 31, 2017. https://ssir.org/articles/entry/how_good_is_your_evidence

* Houston, D., Wright, B., & Wallis, S. E. (2017). Re-structuring evaluation findings into useful knowledge. *Journal of Multi-Disciplinary Evaluation*, 30(29). http://journals.sfu.ca/jmde/index.php/jmde_1/article/view/481/436

Webinars on Causal Knowledge Mapping

* Wright, B. & Wallis, S.E. Washington Evaluators Virtual Brown Bag: Causal Knowledge Mapping for More Useful Evaluation. June 27, 2017. https://www.youtube.com/watch?v=fpgHir8pk0Y&feature=youtu.be

* Wallis, S.E. & Wright. B. Network Knowledge Mapping: Mapping the Known, Discovering the Unknown. School of Public Affairs, University of Colorado Denver. November 9, 2016. https://www.youtube.com/watch?v=-15wyiyaiZQ&feature=youtu.be

Software/Tools for Creating Causal Knowledge Maps

* Bellinger, G. Many YouTube videos on using KUMU. https://www.youtube.com/watch?v=x1vdO4kdw0k&t=25s

* KUMU Docs https://docs.kumu.io/

* Wright, B., Rostami, A., & Lewis, L. (2016). *Tools for Mapping Your Strategic Plan*. Meaningful Evidence, LLC. http://meaningfulevidence.com/strategic-mapping-kit

The Basics of Integrative Propositional Analysis

When evaluating conceptual systems (e.g. theories and models), traditional methods have generally focused on the quality and/or quantity of data used in creating them. While necessary and useful, that approach is insufficient. It has not led to the development of theories and models that are highly useful within the humanities or the social/behavioral sciences. As a result, we have been unable to effectively understand or resolve serious social problems such as organizational change, economic development, poverty, and so on.
Within cognitive science, Integrative Propositional Analysis (IPA) is an emerging method for rigorously and objectively evaluating the potential usefulness of conceptual systems such as theories and policy models. Where past scholarly practice has focused on empirical approaches (the *correspondence* between concepts and reality), IPA is focused on the *coherence* between concepts. Its philosophical base includes the idea of the dialectic (e.g., Hegel) and the idea that the various branches of the dialectic structure may be understood in relationship to each other (e.g., Nietzsche).

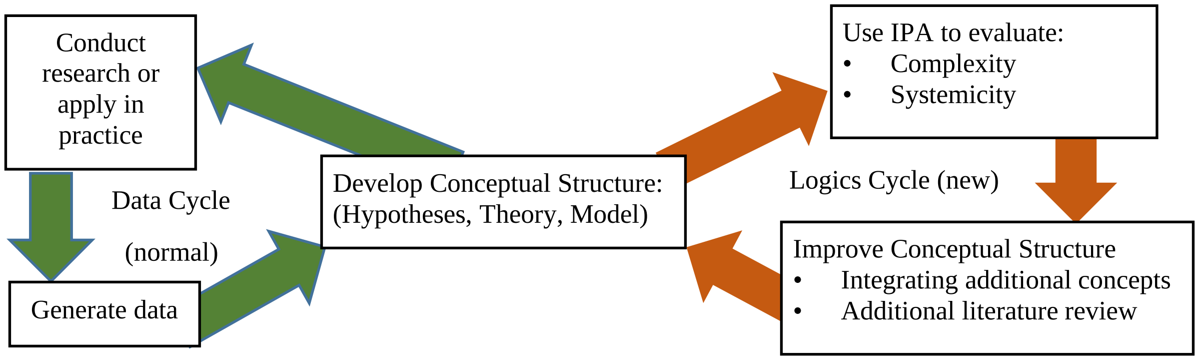
Building on insights from systems thinking (e.g., cybernetics and complexity theory), we may assume that we live in a world of systems (physical, ecological, social, etc.). The IPA perspective suggests that such a world would be best understood and engaged by theories and models that are themselves systemic. This perspective is supported by the research stream associated with Integrative Complexity, which shows how persons and teams holding more complex and more integrated conceptual structures are more likely to be successful.

In short, IPA is a method for evaluating the conceptual *structure* of theories and models. Those that are more complex and more systemic can be expected to be more useful in practical application. For a more detailed explanation, please see “The science of conceptual systems: A progress report” by S. E. Wallis, in *Foundations of Science* (in press, available on request). Importantly, IPA provides a set of rules for indicating objective directions for improving theories and models.

In this handout, you will learn:

- The place of IPA within a typical stream of research
- The basics of how to use IPA for analyzing conceptual systems (e.g. theories and policy models)
- Some uses and benefits of IPA for accelerating the improvement of theories and models for practical application.

IPA's Place in a Typical Research Stream



The Basics of Using IPA to Evaluate Theories and Policy Models

The "data" or subject for an IPA evaluation consist of any theory or model that is of interest to the researcher. IPA is focused on propositions within the theory indicating causal relationships between two or more concepts. Therefore, IPA may be (and has been) used to analyze theories from the natural sciences as well as the humanities and social/behavioral sciences.

For larger studies, a researcher may choose to evaluate multiple theories chosen at random. Or, for smaller studies, a researcher may simply want to evaluate his or her own theory. Generally, one "threshold" test for the face validity of a theory is to ask if that theory has been published in an academic journal or other peer-reviewed publication. IPA has also been used to evaluate policy models that have been published or presented in political speeches. So, there are many sources of useful subjects for analysis.

The core of IPA is reached by following these six steps.

1. **Identify propositions** within one or more conceptual systems (models, etc.)
2. **Diagram** those propositions with one box for each concept and arrows indicating directions of *causal* effects
3. **Find overlaps** between causal concepts to eliminate redundancies and link concepts within and between propositions
4. Identify the **total number** of concepts (to find the Complexity)
5. Identify **concatenated** concepts
6. **Divide** the number of concatenated concepts by the total number of concepts in the model (to find the Systemicity)

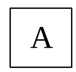
Here is an abstract example:

Step #1 – Identify propositions within one or more conceptual systems (models, etc.)

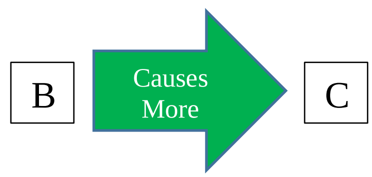
A is true because etc., etc., etc., Also, in my opinion, more B causes more C, for example etc., etc., etc. Therefore, people should etc., etc., etc., because we are not sure about how F might relate to A; nevertheless, we believe that more C causes less D. In some circles, it is generally accepted that more E causes more D this does not mean etc., etc., etc.,.

Step #2 – Diagram those propositions with one box for each concept and arrows indicating directions of *causal* effects

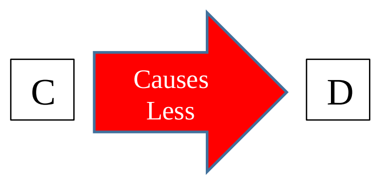
Proposition #1: A is true



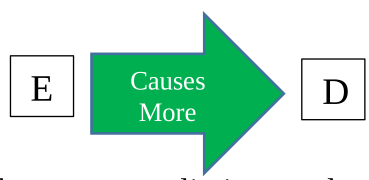
Proposition #2: More B causes more C



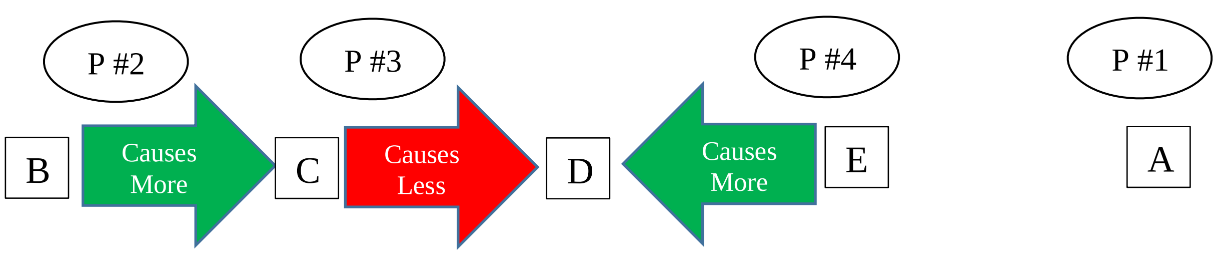
Proposition #3: More C causes less D



Proposition #4: More E causes more D



Step #3 – Find overlaps between causal concepts to eliminate redundancies and link concepts within and between propositions.



Step #4 – Identify the **total number** of concepts (to find the Complexity)

From the immediately above figure, each concept is in one box. And, there are five boxes. So, the Complexity of the model is C = 5.

Step #5 – Identify **concatenated** concepts

From the figure immediately above, there is one concatenated concept (D). It is concatenated because it has two causal arrows pointing towards it (more causal arrows would also be acceptable –- two is the minimum).

Step #6 – Divide the number of concatenated concepts by the total number of concepts in the model (to find the Systemicity)

Because there is one concatenated concept divided by five total concepts, the Systemicity of the model is S = 0.20 (this hints at a 20% chance of successfully achieving stated goals for policy).

Some hints, uses, and benefits of IPA for improving theories and models for practical application.

It is important to use the author's own words when evaluating theory. Otherwise, one may slip into an accidental misrepresentation of the conceptual system. It is also good to use complete theories rather than "cherry picking." Of course, inferences should be kept to a minimum.

Complexity is a weak indicator for the usefulness of the theory. Systemicity is a measure of the theory's internal coherence –- a stronger indicator for the potential usefulness in practical application. Of course, the theory should also be evaluated for the correspondence between the concepts and empirical data. When the Systemicity is 1.0, the theory is amenable to algebraic manipulation and is expected to be highly effective in practical application. Policy models and theories of the social/behavioral sciences typically have a Complexity under 20 and a Systemicity under 0.30. This provides a new explanation for why we are unable to understand and resolve the wickedly complex problems of the world.

IPA provides a new view for improving theoretical models. Generally, we ask:

- What concepts might be added to increase the Complexity?
- What concepts might be causally connected to increase the Systemicity?
- What empirical research might identify additional concepts and causal connections?
- Who might be brought in as collaborators to create a more comprehensive model?

IPA is also useful for:

- Integrating multiple perspectives among stakeholders
- Accelerating the advancement of science and the improvement of policy
- Choosing between policy models for implementation
- Coordinating research efforts within and between disciplines and departments
- Reducing the chance of making fundamental attribution errors
- Playing as a game (ASK MATT) to improve understanding in classrooms

Some Practical Applications of Integrative Propositional Analysis

1. Evaluation of existing conceptual system (policy model, law, theory, etc.) to determine its Systemicity (potential for achieving the goals stated in its text).
2. Application periodically during creation and/or evolution of the policy model to maintain its highest level of Systemicity (potential for success).
3. Remediation of existing conceptual systems that failed to achieve their goals and/or caused undesirable unanticipated consequences.

Professor's Tip Sheet
for playing the ASK MATT game in class

Here are a few hints for helping your students to get the most out of an ASK MATT game.

Helping Players to Clarify their Thinking

This is a very important step because we are helping students to take existing knowledge and mold that knowledge into a form that is more useful for improving understanding and effective decision making. This is a great benefit of the ASK MATT game – because the rules encourage players to frame their knowledge in ways that are more useful. For example, trying to find Points of Interest (POIs, concepts, "stuff") that are measurable.

Essentially, the students are adding two things to the map – POIs and Causeways (indicating causal relationships between POIs. POIs may be as simple as "money" or as complex as "left handed monkeys with parasitic relatives who sing using kazoos." We cannot know in advance what kinds of POIs may prove useful. As professors, we can only help them to improve their shared understanding.

The ideal is to have each POI presented as a "**scalar**" form. That is to say, something that is amenable to change – or something where we can measure change on some scale. For example, "money in the bank" can be measured on a scale of zero to infinity (well… at least a very large number). Efficiency might be measured from zero to one hundred percent. So, those provide useful components for a map. In contrast, a POI such as "the world" is not scalable – as we have only one plant.

It is useful to ask students questions such as: Is it scalar? Can it change? Is it measurable? What causes it? Can we categorize them? Also, if a student plays a POI such as "the world" or "the bad guys" it is helpful to ask clarifying questions to help focus the POIs. For example, "Are we talking about the number of bad guys, their strength, the skills of their people?" Asking those kinds of clarifying questions helps students get out of binary thinking. A key test here is to ask, "Is this something that can this be changed?" gravity, for an extreme example, is not likely to change! Will there always be bad guys? Sure. The deeper question is how they may be understood with greater depth.

Remember that POIs should be "scalar." So a POI such as "everyone should believe the same thing" is not a good POI. Instead, encourage players to have something like, "more similarity of thinking." Also remember, one cannot have a "negative" POI. For example, "we will never make progress as long as there is a wall" won't work well. Instead, "The lower the wall, the more progress we will make" works much better.

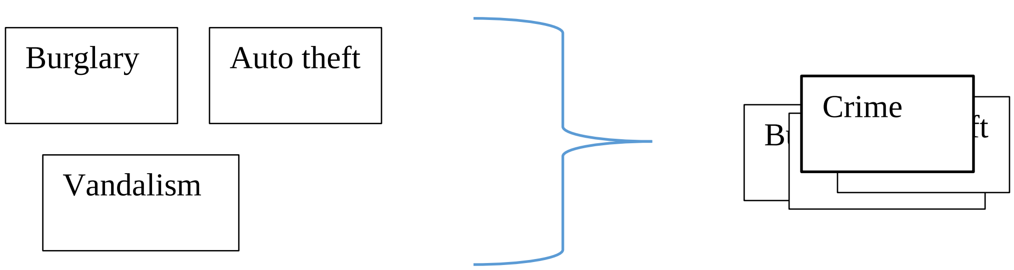
Another approach to help students think about scalability is to help them think in terms of measurability. While most of the map should be based on measurable POIs, it is acceptable to have a few non-measurable POIs. One technique for developing a better understanding of unmeasurable POIs is to see them as a "black box." We don't know what is going on inside there. However, if we can measure the inputs and outputs (as POIs on the map) we can understand how to make that black box a useful part of the map. For example, we might not have a good way to measure "national predilection toward war" on a daily basis. However, we could measure the "inputs" (e.g. number of threats from surrounding nations, level of the economy) and the "outputs" (e.g. inflammatory statements by politicians, voting for hawkish candidates). Combined, those inputs and outputs give us some hint as to what is going on in the "black box" of the unmeasurable POI.

It is critical that students understand the importance of **causality**. If we cannot identify how one thing causes change in another thing, then we don't understand the relationship between them.

A student might state something like, "Loyalty is key to our success." In response, a professor might ask, "Can you rephrase that as a causal relationship?" Or, possibly, rephrase the statement and reflect it back to the player. For example, "Do you mean, 'The more loyalty our citizens feel, the more success our nation will be?'" (please note here also… we might ask how to measure "loyalty" and how to measure "success").

It is not useful to place a Causeway stating something like, "A is related to B" or "A is more important than B" because those are not causal relationships. It might be reasonable to say that some things cause more change than others. For example, "Small changes in A cause large changes in C" along with "Large changes in B cause small changes in C." of course, ideally, the student will be able to identify specific relationships between those changes.

On one level two players might identify POIs that are the "same thing." Or, it may be useful to tidy up the map by clumping POIs that are very similar. Then, a new POI might be added as a title for that category. That process of **categorization** may be understood as an alternative to causality (useful in some ways, not so much in others). If there are two or more POIs that are very similar, they might be placed into the same category. For example, "Burglary," "Auto theft," and "Vandalism" might all be categorized under the more abstract concept of "Crime."



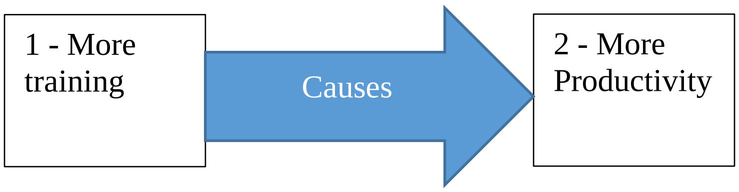
The same kind of process also works in reverse to take an abstract concept such as "Crime" and deconstruct it into more concrete understandings (e.g. "Vandalism").

Further, it is sometimes useful to start with a complex POI and "unravel" or "unpack" it to identify simpler POIs that might be easier to work with. For example one POI, "Health care delivery in urbanized areas where potential recipients don't trust health officials from foreign nations." Might be made into multiple POIs including, ". "Health care delivery," "Residents who could benefit from health care," "Trust of doctors," and so on.

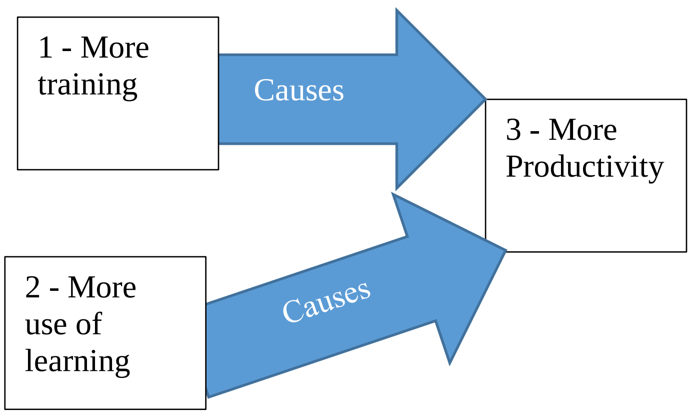
An opportunity for confusion arises when players confuse the causal relationships with POIs in boxes. This may be seen, for example, in the following figure:

This is not strictly a causal relationship. There are a few ways to “fix” this – depending on the needs and interests of the students.

A simple approach might result in the following:



A more interesting, more complex and more useful version might be:



This model creates a transformative structure, reflecting a deeper understanding of the situation. Additionally, it raises interesting questions in the "white space" to the left of Box #2 – what causes more "use" of learning!

In short, we can evaluate statements as representing a valid proposition if they can be phrased as clear causal relationships. We cannot use statements that are fuzzy or unclear. Nor can we use statements that are not causal. For example, "I like to have fun" does not express a causal relationship. However, it does provide an opening to explore those relationships. For example, a facilitator might ask, "What causes you to have fun?" or "What are some of the things that result from you having fun?"

Fuzzy statements might relate to POIs such as, "I don't know what it is, but I know it when I see it." Or "I don't know how to describe it." Or, they might relate to causal relationships. For example, "I don't know what is going on, but we seem to have problems on Tuesdays." It is difficult to express "Tuesday" as a casual relationship. To say, "more Tuesdays cause more problems" doesn't sound quite right. That is a clue that the situation is not well understood. After all, we can't really reduce the number of Tuesdays experienced each month; and we would have difficulty explaining something as fuzzy as "problem." These, also, provide the opportunity for facilitated conversation to explore what is going on.

The conversation should continue until the underlying causes and results can be mapped (and, hopefully, measured). If the students are stuck, it may be necessary to take a break to stimulate new thinking, give them a chance to access their textbooks (or Wikipedia).

Some Variants for Starting the Game

The rules for playing ASK MATT provide the simplest way to start and play the game. Here, we present some other variations that might be useful.

Old Map Start… understanding existing perspectives

> If you want the class to consider an existing position held by one or more groups, it is possible to start with a causal diagram or text from a textbook, academic paper, politician's speech, policy paper, bill before Congress, or other source. The starter map may be created by the whole class, a small team, or by the professor.
>
> Players then reflect on the map. Next, players may challenge the validity of the causal connections, add additional POIs, or make other changes that suggest opportunities for research and/or practical engagement (generally, play the game normally). Those challenges and POIs may be drawn from the students' own understandings and/or other sources (textbooks, news, etc.).

Shotgun Start… negotiating meaning

> All players, at the same time, write 2-4 POIs based on the topic and place them on the map as quickly as possible. This may serve to accelerate the map creation process.

However, it should be followed immediately by a comparison of the POIs to identify which ones should be merged together (see above sub-section on categorization). And, possibly, what embedded POIs might be revised or separated for clarity.

Goal-Based Start… a more comfortable perspective for some

Begin by asking the players a leading question such as, “What goals are important for this topic?” Is it reducing poverty? Increasing innovation? The answer(s) to that question becomes the first POI(s). Next, ask players to identify inputs, “What is needed to reach that goal?” Then, ask what might be needed to reach those intermediary steps.

Two-Stage Start… for situations with limited time

If students are slow to grasp the game as a whole, consider starting with a “brainstorming” session. Ask the class to brainstorm POIs from the text or the topic. As they do, write the POIs on the board or chart-paper. Between classes, write the POIs onto cards. Then, at the next class, provide the students with the pre-made cards. Now, their play is to simply place Causeways and consider their validity.

When play slows… finding inspiration and insight

Ask players to choose one POI each. Ask that they imagine that they will be doing the work to make that POI happen. Ask – “What additional inputs would you need to be successful there?” Is what they need on the map? Good place to add a Causeway. If what they need is not on the map, time to add a POI and a Causeway.

Accelerating Play

If the players are experienced, they may be allowed to place two pieces per turn.

“Free-flow” is not suggested – where players place pieces in a mosh-pit frenzy. This leads to confusion and distrust of the map and other problems. Each move should be carefully considered by all players to ensure the creation of the best possible map.

Location of the Map

Generally, the map is best played on a large table and the table covered with large sheets of paper so that the game may be saved for suture conversations (and moved more easily). It is also possible to play on the floor. Another possibility is to have the professor (and one or two assistants) at the front of a lecture hall – creating a single large map at the front of the room using a projector so that all may see the map).

Critical Thinking

Generally, it is best to encourage critical thinking among the students.

First, it is always important (and usually beneficial) to “ask the class.” You can look at the map – even one component at a time - point to each specific relationship (e.g. More A causes more B) – one at a time – and ask “Is this relationship reasonable, valid, acceptable?” The resulting conversation will likely highlight underlying assumptions – and the need for a bit of research project to clarify the relationship.

Second, it is good to address complex POIs. For example, if one POI is “protectionism” that might be “unpacked” to become multiple POIs each including a different related component of protectionism (as mentioned above).

Sometimes, a shared map may emerge where there are smaller clusters of connected POIs that are difficult or impossible to connect with the larger cluster. When this occurs, you may ask the class questions such as:

- Is there a POI that is overlapping where we might connect these two clusters?
- Should we put aside the smaller cluster for now to focus on the larger cluster? (note that there is a good opportunity here to conduct another ASK MATT game with a focus on the smaller cluster of POIs).

It is good to ask to what extent is this POI “actionable?” That is to ask, is there any way that we (as individuals, an organization, a nation) can have an effect on this? If a POI is not actionable (for example, interest rates), you might ask questions to develop better understanding and/or alternatives. For example:

- What other things might be causal/resultant from that? (how might changes in that effect our allies, partisans, unaligned groups?)
- What are some alternatives/what also happens?

For actionable POIs, the key is to work with those that are “as simple as turning on the tap.” That means, however, that there may be some very important POIs which suddenly seem impossible. This may prompt a return to mapping and evaluation.

For example, the POI of “world peace.” It is important to identify causal POIs to this to avoid thinking such as, “if everyone would just stop fighting there would be peace” (tautology).

Another technique for making more sense of a difficult POI is the “drill-down” approach. Here, you begin with a complex POI (e.g. “health care”) and make that POI the title of a new ASK MATT map. This is good opportunity to encourage students to take on additional projects and study to gain still deeper understanding of the topic.

Teams

It is worthwhile to have students work in small groups of three to six. First, because each may participate more fully. Second, because play proceeds at a more reasonable pace. That means more engagement and learning. Here are a few possibilities:

- Start the game with small teams, then ask teams to identify overlaps and connections between multiple maps
- Breakout groups to develop “smaller clusters” of POIs into larger maps
- Teams interested in “drilling down” to unravel highly complex POIs
- Meetings on a monthly basis to re-evaluate the map and improve the map based on their changed perceptions and knowledge gained. Perhaps create a map at the start of the semester, then bring it out for re-evaluation at the end to see how their perceptions and learnings have changed

Potential Issues

In any session, issues may arise that challenge the ability of the professor to move the class forward in a useful and productive way. In this section we will present a few possible issues that you may encounter while facilitating a class – and some strategies for helping them move forward.

False clarity (someone says, “we frequently have a special problem (SP)”.

> Don’t ask for an explanation of the SP. This takes the students away from the map; and, clarity is lost as a long-winded explanation develops into arguments. Instead, ask the person to place (or, ask if you can place) a SP POI. Then, focusing on that, ask the students to identify casual and resulting POIs.

False definitions (someone places an unusual POI on the map).

> Don’t ask them to explain what the POI is…that takes students away from the map). Instead, ask students to identify causal and resulting POIs.

Premature decision... for activist groups

> If the students are using the map to guide an activity, someone may say, “It is clear we need to do “X” let’s stop this planning and go do it!.” This “rush to action” is just the sort of thing that gets people charging valiantly in the wrong direction (or focusing on one direction when a more complex approach may be more successful).
>
> If it is not there already, place a POI “X” on the map – and ask what causes and effects may be connected with it. Ask players to evaluate the Breadth and Depth of the map (and/or other analyses that may be done quickly). If the levels are low, shift the conversation to one about the quality of the map. The individual might feel confident moving forward, but without a good map, others may not! A Depth of 0.50 is recommended before taking action.

Ask players to take a minute to consider the idea. Then, ask them if they want to do some scenario planning… if there seems to be a sense that they are ready to move forward.

Superconnectors (someone suggests that "everything is connected to everything" so their mapping work is done).

Explain – while it may be true that everything is connected, it is also true that some things are more connected than others. For example, the walls of the building are more connected to the roof, then they are connected to the map. Thus, we need to identify those things that are more closely connected – because those will provide more leverage for enabling change.

If there is something that the class agrees is universally connected (for example, gravity effects all things equally), explain that it is ubiquitous and unchanging, therefore, it becomes background and so is not highly relevant.

Take the new POI and (with the permission of the class) create a new focus for future consideration and a new ASK MATT engagement. Or, conduct a drill-down there or at another time.

Hitting a wall (students can't come up with any new POIs or connections).

Encourage the class to gain more knowledge (through formal education, mentoring, or other sources).

Confusion (people look at the map with a dazed look in their eyes). Explain no one can understand the whole model (might mention the General McChrystal diagram – just Google it, you'll see!).

- Encourage students to work with smaller "chunks" of the larger map.
- Take a break and relax.
- Shift the entire map to a higher level of abstraction.
- Identify something more concrete to work with – such as a homework assignment.

Too cerebral (similar to confusion - complaints are made about too much thinking needed).

Take it down a notch and operationalize it a bit – ask people to share what new insights they might identify by looking at the map. Start some preliminary scenario planning or "what if" scenarios. Then, note the limits of understanding when the scenario runs out of POIs.

Low participation (some students are not interested in contributing)

Describe the situation, place the mapping process on hold, and initiate a conversation about the level of participation. What are the potential benefits and costs of the map? Where do students see their relevance in the map (if they don't, it may be that there should be some new POIs placed on the map that are more relevant to the individuals' interests).

Or… Take a break.

Start with smaller groups – each addressing smaller more focused maps. Then, integrate multiple maps.

BIG MAP (students create a huge, big, very large, map).

Break into small groups; ask each to take a chunk of the map and work with it.

Using one huge map, ask small groups to start working from each corner (or other focus – such as looking at causal orphans).

No more progress is possible (despite best efforts of facilitator and students, just can't make the map any better)

OK…more forward with analyses. Even though the map may have low scores, it is still a starting point. Ask students to report on what they know, what they don't know (blank spots). Where they might success (Gold Stars). Where they might apply the most effort (leverage points). What Beltways suggest the opportunity for reinforcing feedback and continued success.

We hope you have found these tips useful. And, we hope you will share your own experiences with us and others at the email address below and/or online through social media such as:

https://www.facebook.com/askmattgame/

https://askmatt.solutions/