# A SYSTEMIC INTEGRATION APPROACH TO DESIGNING INTERAGENCY RESPONSES TO WICKED PROBLEMS

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## ABSTRACT

Wicked problems are open-ended, highly interdependent issues that cross agency, stakeholder, jurisdictional, and geopolitical boundaries. This confounds conventional approaches to government because policies and budgets tend to be aligned within these boundaries and not across them, making it difficult to bring the appropriate talent, knowledge and assets into an interagency approach to tackle whatever wicked problem is at hand. In response, there has been advocacy for a 'whole-of-government' approach, which employs various methods to achieve either centralized control (e.g., the appointment of 'Czars') or partnership working (e.g., high-level committees or multi-agency task forces). However, these vehicles can be ad hoc and insufficiently systemic in the face of the extreme complexity of wicked problems, where interdependencies abound and the purposes, perspectives and values of the government agencies and other stakeholders can often be in conflict, and therefore become part of the problem. The research described in this paper was conducted to develop and evaluate a new Systemic Intervention approach to designing interagency meta-organizations. The proposed way forward is a multi-method approach that combines the Viable System Model (as the organizational design instrument) with Systemic Perspective Mapping (a new participatory problem structuring method) and boundary critique. This approach was trialed on the wicked problem of international organized crime and its interface with local gangs in Chicago. Our research indicates that this new approach offers significant promise for the future management of wicked problems.

Keywords:  boundary critique, systemic intervention, wicked problems, problem structuring methods, viable system model, interagency collaboration, multi-agency working, systems methodology, organized crime.

## WICKED PROBLEMS

The term 'wicked problem' was first used by Rittel & Webber (1973) as a way to characterize multi-stakeholder planning problems that are dynamic, highly complex, interact with other

problems, and involve stakeholders pursuing contradictory aims. A further characteristic that most decision makers find frustrating is that wicked problems have no clear solution, in the sense that there are no definitive and objective answers. In the desire to find neat solutions, wicked problems are often addressed using traditional linear and reductionist approaches as if they were merely complicated rather than complex. A complicated problem is one where the interactions are difficult to comprehend without some kind of decision aid, but there is still an optimal outcome or a 'right answer'. In contrast, a complex problem is beyond complicated because different stakeholders bring different perspectives to bear, meaning that one stakeholder's 'improvement' is a set-back for another (Churchman, 1970), so there can be no definition of 'optimum' that satisfies everyone.

Complicated ('tame') problems are more amenable to being addressed with traditional management science and operational research (OR) approaches (Jackson & Keys, 1984). This is not to say that tame problems are easy to solve, but at least a solution that most people would agree is optimal is actually possible. With a wicked problem, not only are all definitions of 'the optimal solution' problematic, but also what counts as an acceptable time frame differs between stakeholders (Conklin, 2001). Camillus (2008) warns that trying to solve wicked problems with traditional approaches used for complicated problems can lead to unintended consequences (because of interactions with other problems) and a worsening of the situation. This is often because these approaches involve implicitly privileging one perspective and marginalizing others, leading to greater conflict down the line (Checkland, 1981; Spash, 1997)

Wicked problems present some of the most important challenges of our times. While not all public policy problems are wicked, many are, and they fall into the public domain or into the realm of public/private partnerships. Examples include climate change (Lazarus, 2008; Levin, Cashore, Bernstein, & Auld, 2012; Moser, Jeffress Williams, & Boesch, 2012), health care for aging populations (Westbrook et al., 2007; Braithwaite, Runciman, & Merry, 2009), and energy security (Chester, 2010; Sydelko, Ronis, & Guzowski, 2014).

## THE INTERAGENCY AND THE WICKED PROBLEM

Since almost all wicked problems cross agency, stakeholder, jurisdictional, political and geopolitical boundaries, they often confound governments that are designed to address problems that align nicely within their bureaucratic boundaries. This becomes especially pertinent as governments increasingly rely on predominately reductionist science and mathematical models as the mechanisms to address these problems. Wicked problems cannot be broken down into parts and solved independently within the silos of government. Discrete root causes and their effects are very hard to identify in wicked problems, and government decision makers charged with 'solving' these problems often become frustrated with how the problem changes and evolves in non-linear ways. Fuerth and Faber (2012) emphasize how complicated problems are easily identifiable and fall within bureaucratic boundaries, but wicked problems span across such boundaries and organizational missions.

Governments have employed various methods to achieve coordination or control. One approach is to employ experts (sometimes called Czars) who are in charge of specific policies and can coordinate input from across government and private entities. Other organizational approaches have focused on forming high-level committees or task forces made up of representatives from

stakeholder organizations. These approaches are intended to increase cross-government information sharing and identify best-practices. They usually generate reports that include recommendations to policy makers. However, the formation of these vehicles can be ad hoc and they are usually insufficiently systemic to handle the complexity of wicked problems where interdependencies abound and the perspectives and values of agencies and other stakeholders are in conflict, and are therefore part of the problem.

Various authors have observed that, when dealing with highly complex problems, governments struggle with how to effectively address them holistically and bring the right resources to bear from across many agencies (Ling, 2002; Warmington et al., 2004; Davis et al., 2012). A major criticism of interagency collaboration among agencies is that it can be time consuming to build trust, acquire the necessary new skills, and agree on crosscutting agendas (Pollitt, 2003; Christensen & Lægreid, 2007). Other complaints include too many meetings, missed opportunities, inaction, poor synchronization, overlapping goals, and divergent expectations (Weiss, 1987; Pacanowsky, 1995).

Clearly, interagency collaboration comes with a significant transaction cost, but for wicked problems, it is a necessary one. Fresh approaches are required that can minimize the cost while still achieving synergies. For some time, researchers have been looking to develop new methodologies that can bring better success (Ansell & Gash, 2008; Cross, Dickmann, Newman-Gonchar, & Fagan, 2009; Emerson, Nabatchi, & Balogh, 2012; Givens, 2012).

## DEVELOPING A SYSTEMIC INTERVENTION APPROACH

Some of the new methodologies are explicitly based on systems thinking in order to create better (i.e., more systemic or holistic) interagency responses (Coyle & Alexander, 1997; Givens, 2012; Foote et al., 2014). One example is Gregory and Midgley's (2000) success in using Soft Systems Methodology (Checkland & Scholes, 1990) to support 19 agencies in collaboratively developing a regional counseling service for activation in the event of a disaster. Another example that is particularly relevant to this paper as it has informed the basic structure of our own approach, is Midgley, Munlo, & Brown's (1997, 1998) work on designing an interagency organization to improve housing services for older people. This combined boundary critique (to explore the remit of what was needed), Problem Mapping (a problem structuring method that helps people understand how multiple problems interact) and the VSM (to support the design of an interagency organization).

Our research has built on the above to address the question, "Can systems approaches be used to (i) generate a deep, common interagency understanding of a specific wicked problem, and then (ii) design a tailored, agile, interagency response to manage it?" This question revolves around systems thinking because it deals with interagency organizations that are complex systems in themselves; and, as already discussed, the wicked problems they are managing resist conventional approaches to finding solutions that are based on assuming that optimization is possible. Our application area is organized drug crime, and especially the interface between international crime organizations and local gang activity.

In order to address the goals of the research, a methodological framework was needed that embraced multi-stakeholder engagement in the design process, bringing together the various relevant agencies. It also needed to support the use of multiple systems methods, as research shows that there are very few wicked problems where one method can do everything we might need (Flood & Jackson, 1991a; Flood & Romm, 1996; Midgley, 2000; Taket & White, 2000). Finally, the framework would need to help participants deal with boundary judgments through focused dialogue, given the very different concerns of the participating agencies.

Midgley's (2000) Systemic Intervention approach was selected for this research because it addresses all the above requirements. This is in contrast with most other well-tried multi-method approaches that are participative (e.g. Flood, 1995) and welcome methodological pluralism (e.g. Flood & Jackson, 1991b) but do not put the exploration of boundaries up-front (Ulrich, 1993; Midgley & Shen, 2007).

Midgley (2000, p.132) defines Systemic Intervention as "purposeful action by an agent to create change in relation to reflection on boundaries." It unifies two important themes from Critical Systems Thinking: methodological pluralism and boundary critique. Methodological pluralism focuses on the need to draw upon insights and methods from a rich diversity of other systems methodologies, and to creatively design a tailored approach that responds to the requirements of the unique intervention context at hand (also see Jackson & Keys, 1984; Jackson, 1991, 2000, 2003; Midgley, 1992a; Mingers & Brocklesby, 1997; Mingers and Gill, 1997). While Systemic Intervention promotes the mixing of methods from other methodologies, it also encourages learning from the latter to inform the evolution of one's own methodology over time.

However, mixing methods and learning from other methodological approaches is insufficient on its own (Ulrich, 1993; Midgley, 2000): there is also the need for a penetrating exploration of the context of the intervention, paying particular attention to the contrasting values and boundaries being used by different stakeholders, and the conflict and marginalization that can unfold as a result (Midgley & Pinzón, 2011). This kind of exploration is often called 'boundary critique' (Midgley, Munlo & Brown, 1998). It builds on the previous work of Churchman (1970), who describes an 'unfolding process' for systemic analysis, which includes the 'sweeping-in' of as many factors as possible into the system of concern, and from many different viewpoints. Also relevant is Ulrich's (1983, 1988) insight that the unfolding process is inevitably subject to practical constraints, so the key requirement is to bound the exploration in a manner that diverse stakeholders will agree through dialogue is reasonable (and when this is not possible, decision makers are ethically obliged to explain to others why dialogue needs to stop). Special care must be taken to prevent more powerful stakeholders (or 'experts') from simply taking their boundaries and values for granted and imposing them on others (Ulrich, 1996). Thus, dealing with conflict (Midgley & Pinzón, 2011, 2013; Midgley, 2016) and marginalization (Midgley, 1992b, 1994, 2000) is particularly important.

In Systemic Intervention, using boundary critique prior to creatively designing a mixed-methods systems approach helps to mitigate the problem of basing the design on an insufficiently systemic understanding of the wicked problem (Midgley, 2000). Other researchers have used Systemic Intervention for actively creating improvements in several different problem areas (Midgley & Ochoa-Arias, 2004; Midgley & Reynolds, 2004; Midgley, 2006; Foote et al., 2007; Midgley &

Richardson, 2007; Brocklesby, 2012; Espinosa, Reficco, Martínez, & Guzmán, 2015; Lowe, Martingale, & Yearworth, 2016).

## DESIGNING A SYSTEMIC, INTERAGENCY APPROACH TO TACKLE THE ILLICIT DRUGS TRADE

The wicked problem chosen for this research was the illicit drug trade and trafficking into U.S. urban centers. It was selected because it exemplifies an extremely complex and dynamic problem with extensive interdependencies and multiple agencies involved in countering it. These agencies span numerous local/national/international divides.

The drug trade is expanding its influence into major U.S. cities, which has increased concerns about urban crime and violence as well as escalating threats to public health. Although there are collaborative efforts between agencies, as far as we are aware, nobody in the U.S. has ever attempted to use a systemic approach to organize these agencies around the problem as a whole.

Our research was done as a PhD project (the first author is the student and the other two are her supervisors) and there was no funding or authority from a government entity to launch a real interagency. However, to get as close as possible to the real situation, actual agency personnel were recruited to voluntarily participate and reflect on the implications for action in the real world. Logistically, we could involve most of the relevant national agencies, but not every local one across the whole of the USA. Therefore, for the purposes of representing a specific locality, we chose the city of Chicago.

The Systemic Intervention approach developed in this study mixes the following methods:  (1) boundary critique on the part of the team when starting to explore the problematic situation, plus further facilitated boundary critique by stakeholders on their values and boundary judgments; (2) development of a new problem structuring method to generate a systemic understanding of stakeholders perceptions of the problem; and (3) the VSM, informing the development of a board game to help stakeholders design their own interagency organization.

### The Initial Boundary Critique

Boundary critique is a core idea in the social theory and methodology of Critical Systems Heuristics (Ulrich, 1983; Midgley, 1996; Ulrich, 1996; Midgley, 1997; Ulrich & Reynolds, 2010), and is also a foundational part of Systemic Intervention (Midgley, 1992b, 2000, 2006). The theory of boundary critique is important for Systemic Intervention because it focuses on stakeholder purposes and values, and how they are intricately linked to how stakeholders make boundary judgments. Because stakeholders' purposes and values differ, so do their boundary judgments concerning what is relevant to the wicked problem at hand, which often generates conflict. Boundary critique seeks to transcend conflicts through dialogue and collective exploration of different possibilities for bounding the system of concern (Midgley & Pinzón, 2013; Midgley, 2016).

The boundary critique for this research began prior to stakeholder selection. The research team discussed their own attitudes to illegal drugs, the drug trade and the possible consequences for the project. This kind of discussion reflects the understanding in boundary critique that researchers are never value-neutral – even in deciding what to research in the first place, value judgments come into play (Ulrich, 1983; Midgley, 2003, 2008), and stakeholders will inevitably take a stance on the perceived identities of, and communications with, researchers (Midgley et al., 2007).

All the researchers agreed that the many harms stemming from the drug trade are worthy of intervention, and we also agreed that there might well be much better ways of addressing them than current U.S. policy allows. We also shared our previous experiences of working with the various law enforcement and military organizations involved in tackling organized crime, and discussed the fact that many senior stakeholders in those organizations are likewise critical of the status quo and open to alternatives, so we wouldn't automatically be entrenching current policy by working with them.

Finally, we discussed whether drug consumers and dealers are actually stakeholders, which carries the implication that they might need to be involved as participants in the research, or at least have their perspectives represented. We agreed that they are indeed stakeholders, but involving those who had a stake in perpetuating the harms that stem from the drug trade would be counter-productive: our experience told us that none of the representatives of public sector organizations would be willing to share their insights with people engaged in criminal activities. This might sound like we are stating the obvious, but it needed to be articulated because any decision to consciously exclude stakeholders would inevitably influence the course of the project. In this case, we believed the exclusion was justified, as it would not be possible to discuss interagency relationships without agency representation, and we trusted that the agency representatives would remain open to alternative policy options, if relevant.

The boundary critique then continued, going beyond the research team, at a workshop held at the National Defense University in May 2016, to which an initial set of agency stakeholders and other subject matter experts were invited. The group of attendees were all well known in U.S. drug policy circles for their knowledge on illicit drug trafficking. This workshop generated a lot of good discussion and dialogue resulting in generation of the list of suggested agencies that should be included in producing an interagency design. A few additional stakeholders were identified during the course of the research study, and were involved in later workshops. This happened as a result of the systemic learning among the existing stakeholders, who came to appreciate that there were important gaps in their knowledge of parts of the international and local organized crime systems.

The set of stakeholders who participated were mid- to high-level decision makers with an average of 15 years experience working in the following agencies: (1) Department of Justice (Drug Enforcement Agency, Chicago High Intensity Drug Trafficking Area); (2) Department of Homeland Security (Customs and Border Protection, Coast Guard); (3) Federal Bureau of Investigation; (4) Chicago Police Department; (5) Department of Defense (counter transnational crime entities); and (6) Department of the Treasury.

There were suggested agencies that were not included, mostly because attempts to recruit specific stakeholders were not successful. These were the Department of State, others from the intelligence community, other local partners, a couple of non-governmental organizations, and international partners.

Because all the stakeholders volunteered their time to participate even while they were heavily involved in actively addressing this wicked problem, the time allotted to achieve the goals of the study had to be kept manageable for them. Overall, the time stakeholders dedicated to the project was approximately 30 hours each. Only two stakeholders dropped out midway because they could not commit sufficient time.

Throughout the study, information was gathered, through observations, debriefing sessions and anonymous questionnaires (adapting the approach taken by Midgley et al., 2013), on (1) how the participants acted and interacted with each other during the process; (2) what they believed they were able to accomplish as a group; (3) what they valued about the approach; and (4) how they would want to improve it.

## Individual Stakeholder Problem Structuring

The term 'problem structuring methods' (PSMs) was first coined by Rosenhead (1989) and Rosenhead & Mingers (2001). PSMs are qualitative methods that are mostly rooted in the interpretive paradigm, where knowledge is believed to be subjective or inter-subjective, and reality is interpreted by stakeholders with differing worldviews (Jackson, 2006). Multiple perspectives are usually brought together in workshops to provide a broadened focus and deeper learning about the problem situation and possible ways to address it (Franco, 2006). In PSMs, models are used less to 'solve' the problem, and more as 'transitional objects' around which a dialogue can be constructed (Eden & Sims, 1979; Eden & Ackermann, 2006; Midgley et al., 2013; Cronin, Midgley, & Skuba Jackson, 2014).

PSMs traditionally start by bringing all stakeholders together to structure a common understanding of the problem (e.g., Checkland & Scholes, 1990). However, this puts stakeholders directly into dealing with conflicts and possibly interagency posturing before they have even had a chance to think more deeply and systemically about their own perceptions and values in relation to those of others. It was our judgment, having had some experience of stakeholder interactions in our first workshop (discussed earlier), that it would be problematic bringing the agency representatives together from the start if they didn't first get a sense that they could only see part of the picture. The danger would be people assuming that only they could see the whole, and others were simply wrong. To avoid this, we developed our own, new PSM approach where all the stakeholders were allowed to express their perceptions in individual sessions before we brought the whole interagency group together. This PSM approach needed to (1) address stakeholders' purposes and values by allowing them to freely capture what they perceived to be the key elements of the problem, and (2) explicitly identify what they perceived to be the interdependencies between these elements.

An innovative PSM to address stakeholder values through the use of visual aids was developed by Cronin, Midgley & Skuba Jackson (2014). While this has been shown to increase mutual understanding, reduce conflict, and build trust among stakeholders, it does not provide a tool for systemically mapping problem elements and their relationships. Causal loop modeling, sometimes used as a precursor to system dynamics (SD) modeling and sometimes as a PSM without SD quantification, provides a method for visually mapping elements and relationships, but it only captures relationships that take the form of positive and negative causal feedback loops (Forrester, 1994). Causal Mapping (Bryson, Ackermann, Eden, & Finn, 2004) helps to map elements and relationships, but imposes probabilistic cause-and-effect thinking. While all the above methods enable visual mapping of systemic relationships, they limit the ability to capture stakeholder perceptions in an 'unfolding' way that values the full range of possible relationships between elements. 'Rich picturing' (Checkland & Scholes, 1990) is better in this regard, as stakeholders can capture viewpoints as well as relationships in their models, but even this has two drawbacks. First, the person or people who draw the model are generally the only ones who can fully understand it, as its 'messiness' makes it of limited utility for communicating with others (Boyd et al, 2004). Second, this problem of communication means that it would not be easy to combine individual models into a single group one.

*Systemic Perspective Mapping*

We therefore designed a new method, which we call Systemic Perspective Mapping. It is relatively simple and hands-on, and allows agency stakeholders to add, remove, set-aside, rearrange, and manipulate the elements and interdependencies as they develop the structure of the problem, either alone or in a group. In addition, the approach includes a way to capture how different stakeholders weight each element and relationship. As will be explained, this information was critically important for later in our study when the stakeholders went on to explore boundary judgments with others.

Systemic Perspective Mapping captures the problem perspectives from stakeholders by simply using note cards, sticky notes, and felt markers. Perception mapping sessions were first conducted with individuals. The process entailed facilitating systemic thinking around the problem by having stakeholders directly identify and describe what they consider to be key elements of the problem (e.g. cartels, drug laboratories, growers, gang members, distributors, and customers). To begin, stakeholders were asked to write the names of problem elements on note cards and place them on the table. They were cautioned to only define what they saw at that time as the wicked problem without jumping to solutions (this is understandably difficult for most stakeholders, and required some facilitative interventions). No boundary requirements were given, so stakeholders could include or exclude any elements they wanted, which was important in terms of preventing too much pre-framing by the researchers. Throughout the process, stakeholders were given the freedom to arrange and group elements if they wished to. They were also asked to assign a weight for their elements (1 to 5) in order of the importance to policy and practice that they thought should be placed on those elements. This weighting was guided by asked the question 'Which elements would you choose to intervene in first to impact the problem?' Those elements would be a 5. Elements with very little perceived impact were given a 1. Elements in between were weighted last. The participants were allowed to go back and change their weightings as their map unfolded.

This was important, as the weighting was started quite early in the process, and as relationships between the elements were added, this sometimes changed people's perceptions of importance.

Next, participants were asked to use sticky notes (with single or double-headed arrows on them, or words of explanation) to represent the relationships or links between elements. For instance, the relationship between gang leaders and street corner dealers might be delineated as part of the context of the problem (answering the question, 'what is important about the relationship as it relates to the successful operation of the illicit trafficking enterprise?'). Stakeholders were then asked to weight these relationships from 1 to 5 in order of their importance (as was done for the elements). When finished, elements and relationships formed a 'systemic perspective map' of the wicked problem from each stakeholder's point of view. The final systemic perspective maps for all the individual stakeholders were photographed (Figure 1 shows two examples).



**Figure 1: Photographs of example systemic perception maps created during individual stakeholder meetings**

After each mapping session, the photographs taken of the individual stakeholder systemic perspective map were used to create a new version in the software package Cytoscape (http://www.cytoscape.org/). To ensure that the electronic versions were accurate representations, an iterative process was used to allow stakeholders to make corrections or add more information. Examples of the resulting Cytoscape perception maps are shown in Figure 2.
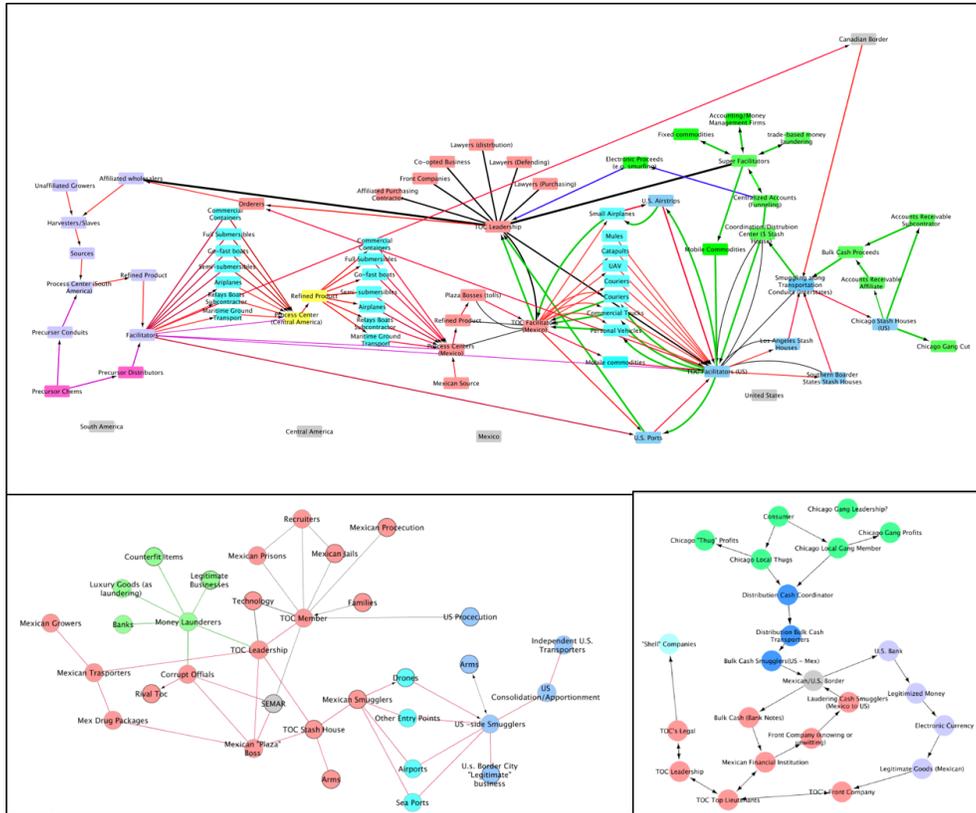
**Figure 2: Three example Cytoscape versions of systemic stakeholder perception maps**

All 13 stakeholders who participated in these Systemic Perception Mapping sessions were sent a questionnaire asking for their impressions and feedback on the process. Nine stakeholders returned the questionnaire. 89% (8 of the 9) responded that they found the PSM sessions to be "very useful". Many said that they felt they were already systems thinkers, but had never used this term before. They liked the way Systemic Perception Mapping helped them to 'download' what was in their heads, and they said that it 'jogged their memories' to identify elements that they at first did not include. They also felt it gave them the ability to openly and honestly express their perspectives without the pressure of having other agencies present. Clearly, the goal is to work together toward a greater common understanding, but starting without this pressure allowed stakeholders to get their views 'on the table'. This unprompted feedback vindicated our decision to create Systemic Perception Mapping as a two-stage process, first involving individual mapping before bringing people together in a group.

Stakeholders overwhelmingly remarked on the how this process allowed them to see their problem at a 'higher' level than usual. Specific comments included: "it was the first time I had a visual depiction of the interconnectivity of each element"; "I liked the process of making each entity from a strategic standpoint. It forces me to take a step back and really focus on the who/what are the main entities"; and "The process allowed me to take the time to look at my role when addressing the 'problem'. I was able to visually see how my participating and role is vital to the overall system".

The average time for the in-person session was 1½ hours. One stakeholder wondered if using the mapping software directly with stakeholders would reduce this, but the time it would have taken to become familiar with the software, even for a tech-savvy stakeholder, would likely have prolonged the meetings instead of reducing them. Additionally, we feared that introducing formal electronic software too early would have created a distraction and would have been less 'free-form' than working directly with tangible objects like sticky notes.

Cytoscape was then used to merge all the individual systemic perception maps, including all the elements and interdependencies, as well as their weights. Figure 3 shows the unedited, merged map.
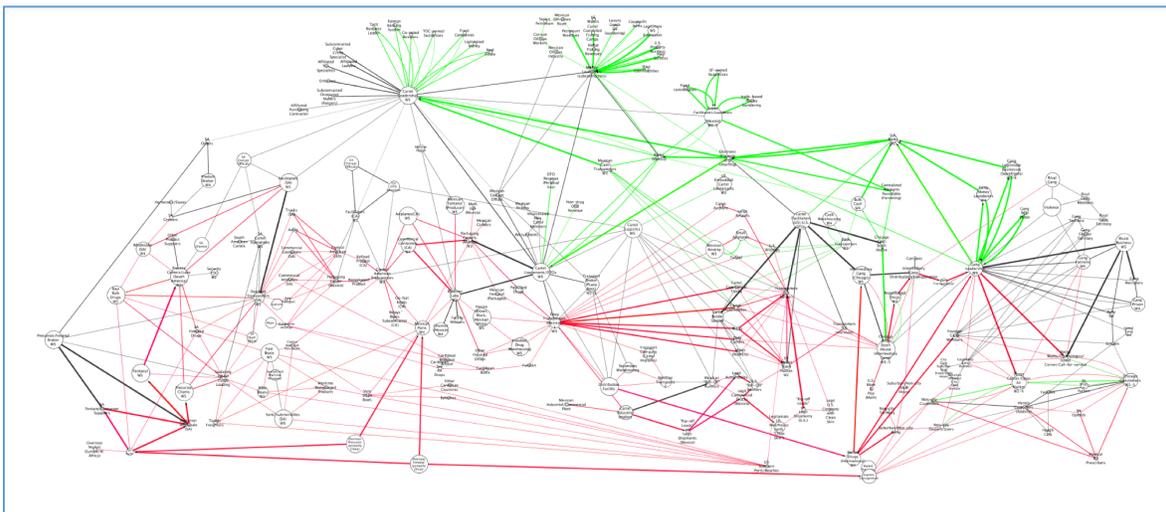


**Figure 3: Merged individual systemic perspective maps in Cytoscape**

**Boundary Critique to Create a Common Systemic Perception Map**

The merged systemic perspective map (using Cytoscape) that resulted from the individual problem structuring can essentially be viewed as a form of what Churchman (1970) calls the 'unfolding process', which represents the unconstrained 'sweeping-in' of all stakeholder perspectives. As would be expected, the freshly merged systemic perspective map was full of discontinuities, conflicting weights, nomenclature issues, and missing elements. These discontinuities and conflicts represent some of the difficulties the agencies have in communicating with one another. Nevertheless, the map was a resource to start to find a way forward.

To bring some order to the 'mess' in the combined map, some collective judgments were needed on terminology, linkages and weightings. Boundary critique can be used to help make such judgments, as it focuses not only on boundaries of inclusion and exclusion, but also on the value judgments that lie behind boundary choices (Ulrich, 1996, 2003; Midgley, 1997; Midgley, Munlo & Brown, 1998; Midgley & Pinzón, 2011). In many traditional forms of analysis, boundary decisions about complex problems are usually the province of only one or just a couple of

stakeholders (or 'experts') who have, for historical reasons, been granted the authority to make boundary decisions. Even when discussing issues and making boundary decisions in a multi-stakeholder group, inequities can arise when certain stakeholders exert disproportionate power and influence. This risks the marginalization of important value and boundary judgments of other stakeholders, and boundary critique not only helps the research team theorize marginalization (Midgley, 1992b, 1994, 2000; Midgley & Pinzón, 2011), but it also suggests ways to address it in facilitated dialogue (Midgley, 1997, 2000; Midgley, Munlo & Brown, 1998; Córdoba & Midgley, 2003, 2006, 2008; Boyd et al., 2004; Midgley & Pinzón, 2013). The likely implications of marginalization are not only that it can affect how the problem is defined, but also how it is approached and what future interventions are identified. This is why boundary critique is so important when dealing with wicked problems that are, by definition, multi-stakeholder.

*The First Boundary Critique Workshop*

To reconcile differences in the merged system map and make collaborative boundary judgments, the stakeholders were invited to a one-day, collaborative, boundary-critique workshop. Notes were taken on the dialogues and interactions that took place between stakeholders. Five stakeholders representing 5 different agencies were available to participate. During this workshop, stakeholders were asked to work through a large laminated printout of the systemic perspective map laid out on a table (Figure 4). First, they looked for elements that had multiple names. They either decided that these were just nomenclature issues and agreed upon a single name, or they decided that they actually represented different nodes. Separate nodes were then noted with sharpies on the map. They also collaboratively added elements they felt were missing.
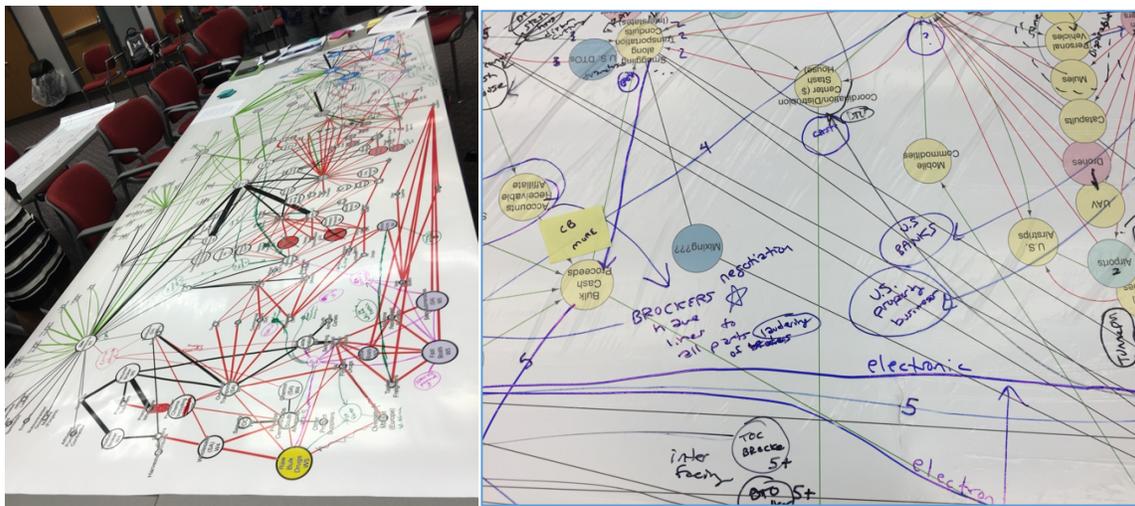


**Figure 4: Photographs of the marked-up merged systemic perspective map
after boundary critique**

Within the common stakeholder map, the weights for the elements and interdependencies were carried over from the individual systemic perspective maps. Some elements or interdependencies were unanimously weighted with the same value; but in many cases, a range of weights were

assigned. Here was where the boundary critique became an important part of structuring the problem, with stakeholders exploring and justifying their preferred weights through dialogue.

For some elements and relationships with just small differences in weightings (and hence small differences in values being brought to bear), quick compromises were often made. Elements with wider ranges of weights/values typically required more discussion. For instance, one element had weights ranging from 1 to 5. The weight of 1 was given by a stakeholder with a national/international perspective. A stakeholder with a more local perspective had valued this element at 5 and said it was one of his top priorities. The other stakeholders were somewhere in the middle. Through a relatively lengthy dialogue, these two stakeholders shared why they chose their weights and they ultimately agreed on a weight of 3. Without hearing the dialogue, it might be assumed that this was just a 'fudging' of the difference, but this was not the case. The local stakeholder agreed that, when seen from a broader perspective, his high-value element was not as crucial as it at appears from the perspective that comes from deploying his narrower agency boundary. Similarly, the national/international stakeholder found the local perspective compelling and changed his position. This particular negotiation happened without much intervention by the facilitator.

In a minority of cases, the 'dialogue' was more one-sided. This appeared to be either because some stakeholders were much more vocal and extroverted, or because more junior stakeholders were intimidated by stakeholders with higher rank. Facilitation was necessary at times to make sure all those who stepped back from engagement were asked for their opinions. Even when directly prompted by the facilitator, however, one stakeholder remained unwilling to engage in disagreements, and this had to be accepted as a limitation of the effectiveness of the boundary critique. In just a few cases, stakeholders remained so firm on their weights that the decision was to assign more than one value to those elements, with notes added about the meanings of these differences.

The discussion of relationships brought up more questions than the weighting of elements did. It was obvious that stakeholders had not thought as deeply about all the interdependencies and relationships as they had about the elements in isolation, and it became very clear at this point just how important these relationships are when dealing with the wicked problem.

Some of the interdependencies within the illicit drug trade were in the context of supply chains: the flow of drugs and the laundering of money. Because these logistical relationships were more familiar to the stakeholders than others, the weighting was relatively straight forward. However, other interdependencies represented relationships within the cartel operations. Because cartel organizations are purposely very flat, clear hierarchical relationships were not evident. The more obscure and non-direct relationships were difficult to define and weight. Not only were there a lot of good discussions about how to assign weights to the interdependencies, stakeholders found that they had differing opinions on their nature. For example, one stakeholder would identify a relationship as one of employment, while another stakeholder understood it to be contracting. The difference between these two was very important in understanding the structure of these flat, covert, cartel organizations. Through the dialogue process, the group was able to work out these issues and come to agreement on most of them.

As the final exercise in this boundary critique workshop, stakeholders were told they had a budget that would cover eight to ten interventions, and they should collaboratively identify those that would most impact the illicit drug trade. Although this exercise artificially frames intervention as a zero-sum game (under pressure, people often don't think that a priority for intervention might be finding ways to increase the resources available), it was done to illustrate that, when designing an interagency organization, budget and resource issues may stimulate conflicts, and the boundary critique process must be used to work through them collaboratively. Putting additional budget pressures on countering the problem resulted in good dialogue and helped the participants consolidate their emerging team identity.

*The Second Boundary Critique Workshop*

Our first boundary critique workshop (discussed above) was facilitated to encourage full participation from all stakeholders, asking each to comment and reflect on any proposed change. This workshop ultimately generated a draft common perspective map, but it also resulted in suggestions for additional stakeholders who could help fill in some gaps they identified. Four new stakeholders were recruited, and individual Systemic Perception Mapping was conducted with each. Subsequently, a second boundary critique workshop was needed to integrate their insights into the first collective map. Three of the stakeholders from the first workshop and three new stakeholders were able to attend this second workshop, and the process unfolded much as before. Importantly, those who had been in the first workshop were not defensive about their map being changed, as they were part of the group who had suggested the need for the new agencies to become involved.

In the second workshop, the budget constraints were pushed a bit further, and only five interventions were allowed. This was done to simulate how resource constraints can drive the need for further difficult boundary judgments about what stays in and what elements will not be addressed. Discussions during this process centered primarily on negotiating between the values placed on the supply-side of the drug trade (a national and international focus) versus the demand side (primarily a regional and local focus). However, through much reflection and dialogue, five options for intervention were ultimately agreed upon. This boundary critique exercise illustrates how including multiple values not only shapes how the problem is structured, but also drives a better coordinated and more integrated approach to managing the problem.

All the stakeholders rated this process as being "very useful" (the highest grade) in their questionnaire returns. Their most common qualitative statements related to how the process helped them to appreciate the wicked problem from other stakeholders' perspectives. Examples of these comments included: "My operational focus is small, this allowed for greater understanding not only of the problem, but other stakeholders perceptions and focuses"; "The different perspectives were critical in properly framing the problem"; and "I gained critical insight and understanding not just from fellow national level agencies but all the way down to the local street cop and how one impacts the others".

Stakeholders also felt strongly that the process helped in giving them a more holistic perspective, and they gained a new appreciation of how their actions could affect others. Overwhelmingly, they felt that the process gave them confidence that the common systemic perspective map generated

by the group could make a difference in countering the illicit drug trade. Here again, there was a desire to spend more time in dialogue and the addition of more stakeholders was asked for. Conceivably, a continued process of iteratively adding stakeholders, folding in their perceptions, and including them in group boundary critique could be pursued until the values and perceptions of all the stakeholders were reflected in the common perception map. However, this was not possible within the bounds of the PhD research.

**INTERAGENCY DESIGN WITH THE VIABLE SYSTEM MODEL (VSM)**

The Systemic Perception Mapping and boundary critique processes provided stakeholders with a deeper, more holistic, and multi-perspective understanding of the illicit drug trade and the potential options for integrated interventions. However, this doesn't mean that the agency representatives thought this was sufficient. They were very well aware that their organizations and interagency communications were structured in silos, which would frustrate effective implementation of their new insights and intervention preferences. The next stage of our project was therefore focused on organizational redesign using the VSM. The VSM is a cybernetic model, first developed by Beer (1979, 1981, 1985), that offers a conceptual framework for designing organizations and communication flows that are closely aligned with the relevant aspects of the outside environment. In this research, we asked the participants to design an interagency organization that could specifically respond to their wicked problem, represented by the common systemic perspective map developed earlier.

Other researchers have previously used the VSM within the context of Systemic Intervention and action (Brocklesby, 2012; Espinosa et al., 2015; Lowe et al., 2016). Midgley, Munlo & Brown's (1998) use was arguably the one that informed ours the most, as these were some of the first researchers to deploy the VSM specifically in the context of multi-agency co-ordination. Likewise, Brocklesby (2012) discusses an interagency law enforcement response to the problem of organized transnational crime, and he advocates for the VSM because it creates a 'big picture' approach that treats agencies as pieces in a much larger jigsaw puzzle.

Beer modeled the VSM after the human nervous system that regulates internal systems to keep in balance with their environment (Beer, 1972). It was inspired by Ashby's Law of Requisite Variety, which states that an organization, like a biological organism, must balance its own variety (which can be thought of as a measure of complexity) to the variety of its environment (Ashby, 1947). Beer describes the organizational behavior that manages variety as 'variety attenuation or amplification' (Beer, 1985). First, because wicked problems have a great deal of variety, the interagency needs to attenuate (reduce) it in ways that make it more manageable. A law enforcement example that Beer (1985) gives is public policy that reduces crime through surveillance, thus allowing the Police to focus their resources where they are most needed. Conversely, he says that amplification, in the law enforcement context, involves things like providing the Police with new communication technologies or weapons to enhance their effectiveness in action. Of course, which methods of attenuation and amplification are chosen, and the balance between them, is a moral as well as a practical concern.

Importantly, attenuation and amplification are about the way an organization *perceives* its relationship with its environment. For instance, attenuation can happen in two ways. First, action can be taken that successfully reduces the variety in the environment, and this is generally

considered a good thing as long as it doesn't contravene widely held ethical standards. Secondly, the organization may erroneously *think* it is in a low-variety environment because its methods of gaining or interpreting information about its environment are inadequate. This is why it was so important to support the participants in our study in gaining a more systemic understanding of their wicked problem before designing an interagency response. Jumping straight to the VSM would have risked the most lethal danger that Beer (1985) identifies: that attenuation is based on ignorance of the environment rather than accurate feedback from it. We would add that there is a corresponding lethal danger of amplification: ignorance of weaknesses in the organization, so managers over-confidently believe they can respond effectively to the variety in the environment and are unaware of their failures. With regard to both attenuation and amplification, the development of useful knowledge (of both the environment and the internal readiness of the organization to respond) is critically important.

The balance between an organization and its environment is called homeostasis. The VSM supports participants in exploring what is needed to maintain homeostasis in a socially desirable manner; i.e., in the case of organized crime, successfully reducing its negative impacts without significant side-effects. It is intended for use as a dynamic model and offers several concepts and principles that enable the design of, or improvement to, an organization, focusing in particular on its ability to continuously adapt and *self-organize* in response to disturbances in its external environment. This important concept of self-organization draws upon the biological theory of autopoiesis (Ashby, 1947; Maturana & Varela, 1980; Von Foerster, 2003).

Beer's use of the term 'viable' refers to an organism's ability to maintain a separate existence (Beer, 1985). So a viable system is a system that keeps its identity while maintaining a co-evolutionary, but still balanced, relationship within its niche (Espinosa, Harnden, & Walker, 2008). Beer applies the concept of viability to organizations. In order to design and maintain a viable organization capable of tackling the complexity of a wicked problem, the organization must be closely attuned to its environment and has to dynamically adjust to disruptions (Beer, 1985).

**The Five Subsystems of the VSM**

In Beer's original depiction, there are five subsystems that represent different roles of an organization. Figure 5 is a general diagram depicting the VSM.
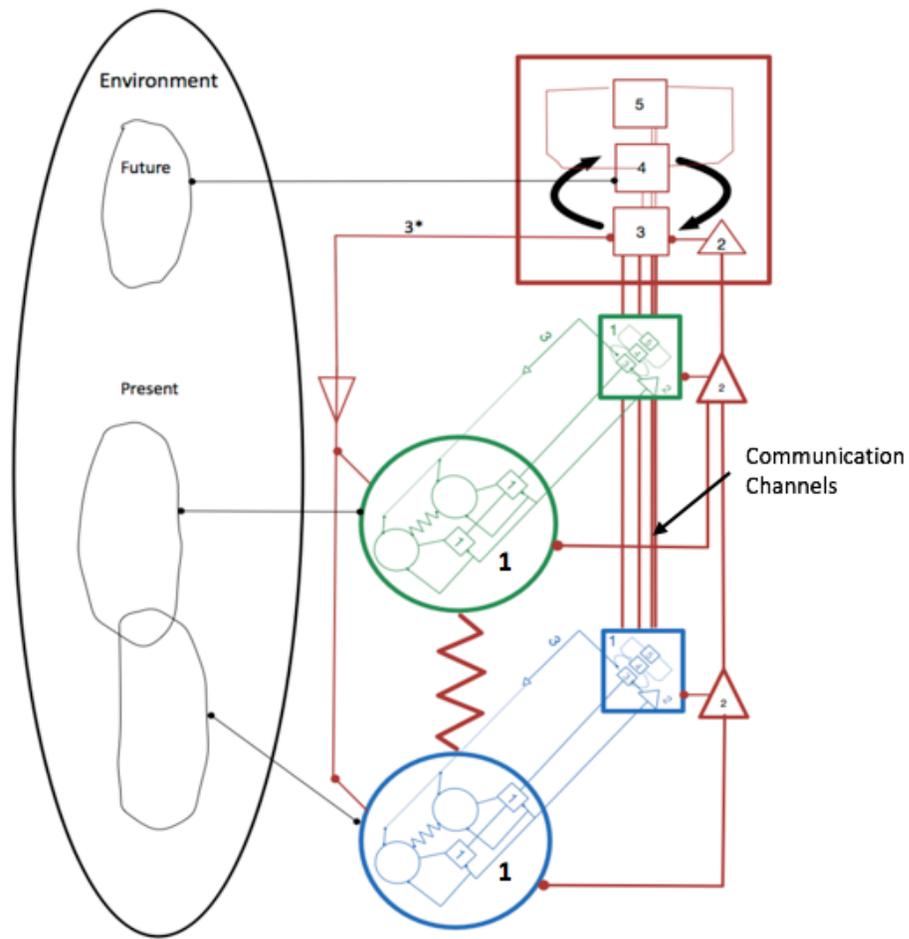
**Figure 5: The Viable System Model**

Below, in Table 1, are descriptions of each of the VSM subsystems and the roles they play. The communication channels shown in Figure 5 carry the information to and from the S1s and management (S3-S5). This flow of information represents one way in which the VSM is a dynamic model. These communication channels must be able to handle rapid knowledge flow; ideally, as fast as the rate at which variety is generated (Hilder, 1995).

**Table 1: The VSM Subsystems**

| | |
|---|---|
| **System 1 (S1)**: | S1 is the operations of the organization, where the production of products or services happens (Espinosa et al., 2015). Within an interagency viable system, the S1s can be the individual agencies that will provide the operational functions within the interagency organization (Midgley, Munlo & Brown, 1998). S1s remain autonomous individual agencies (but within constraints set by S4 and S5 – see later in this table), and because the VSM is elegantly recursive, each agency is a viable organization in itself. |
| **System 2 (S2)**: | S2 deals with day-to-day operations, providing shared languages, protocols, procedures, and information. It is also involved in avoiding oscillations and providing conflict resolution when discord exists between the S1s (Espinosa & Walker, 2006). S2 is a set of coordinating mechanisms needed to keep the agencies in homeostasis. It can include already existing mechanisms that can be leveraged, and it can help to identify when new mechanisms are needed to keep the interagency operations running smoothly. |
| **System 3 (S3)**: | S3 is responsible for regulatory issues, such as resource distribution, accountability, and legal requirements (Espinosa & Walker, 2006). S3 also handles any resource bargaining to ensure all parts are running in the best interests of the whole organization (as determined by the strategic S5 subsystem discussed below). S3 is an especially challenging function to design because it embodies the resource bargain all stakeholders must agree to. Working with S2, S3 manages the continued operations of the interagency. S3 could be a single person (like a Czar). It could be an organization (often one organization will be asked to lead the interagency). Or it could be other constructs like committees or taskforces. But unlike traditional taskforces, where multi-agency personnel meet periodically to collaborate, S3 is a supporting management function to keep the S1s working toward a common goal.<br><br>S3 also uses an auditing system (called S3*) that monitors the activities of the S1s (Hilder, 1995). It offers an alternative channel to generate unstructured information to complement the more formal S3 accountability information.  It can probe the details of the operations without taking over and micromanaging. |
| **System 4 (S4):** | S4 is the intelligence function of the organization. It is responsible for understanding the total environment in which the organization is embedded (Hilder, 1995). Whereas S3 is concerned with 'inside and now', S4 is concerned with 'outside and then' (Beer, 1979) and is the facilitating mechanism by which the identity of the organization adapts. |
| **System 5 (S5)**: | S5 defines the identity of the organization and provides its ethos, purpose, and strategy (Leonard, 2009).  It also supplies logical closure to the complex system. S5 works with S3 and S4 (creating an S3/S4/S5 homeostat) in monitoring the adaptation capability. |

Because the VSM diagram (Figure 5) is oriented vertically, it is tempting to see it as a hierarchy where the management functions (systems 3-5) exert top-down control. In addition, because the agencies (S1s) are intimately involved in their environment (wicked problem) through attenuation, amplification, and intervention, it can be misleading to show the interagency separated from the environment. Figure 6 shows the VSM diagram turned on its side (as recommended by Midgley, Munlo & Brown, 1998). Viewed this way, S2 and the management system can be seen as supporting functions that enable the S1s to do their jobs. This diagram also shows the environment surrounding the interagency to indicate that they and it are intimately entwined.
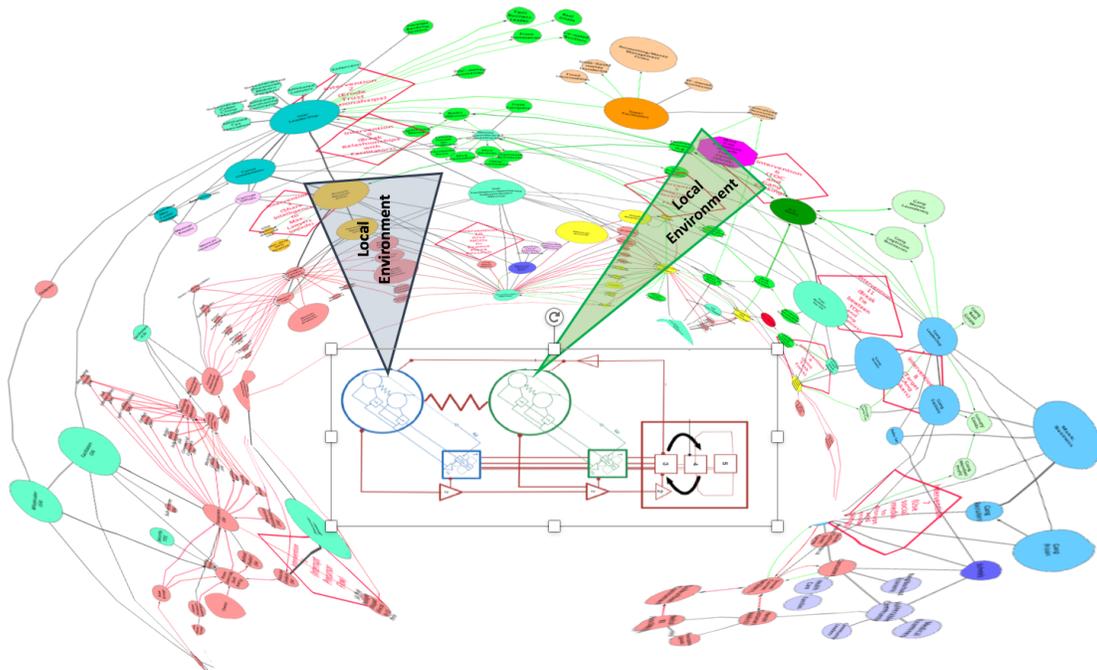


**Figure 6: The VSM embedded in the environment**

## The VSM as a Board Game

The VSM is not hierarchical. Management is treated, not as a control function, but as a support function for operations, and the relationship between the managing functions and operational functions is in the form of a coordinated set of activities and active resource management. From this perspective, the VSM allows the interagency stakeholders to collectively design their own management functions by driving the requirements for those functions themselves.

To make it easier and more intuitive for stakeholders to develop their VSM design, a VSM board game was developed (Figure 7). The board game was deployed in a 1-day workshop using the game as a way to guide stakeholders through the VSM design. By laying out a large VSM template on a table, stakeholders could seat themselves next to their System 1 circles. By posting the common systemic perspective map on the wall in front of them, stakeholders could directly interact

with their representation of their wicked problem environment that they were designing their interagency organization to tackle.
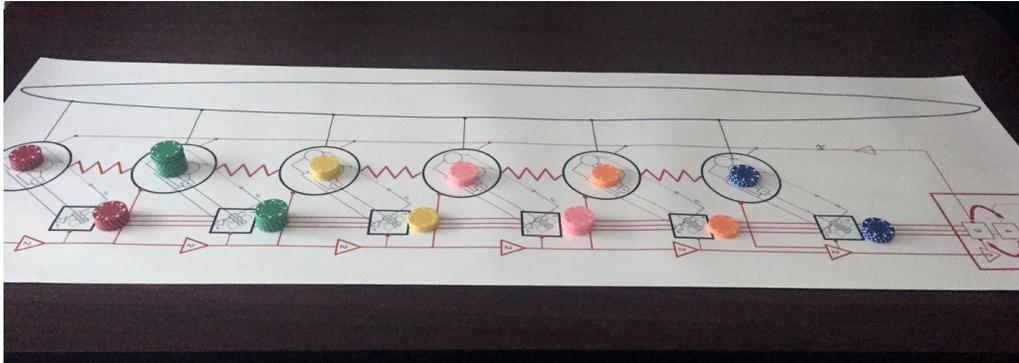


**Figure 7: Photograph of the VSM Board Game**

*Establishing the System 5*

The game started with the S5 because it establishes the ethos and purpose for the new interagency organization. System 5 was thought to be some sort of strategic board or committee made up of the top leadership of the various agencies who could work together to define the remit of the interagency organization. Because our project did not have access to chief executives and other highest-level leaders, our participants (mostly senior managers of one kind or another) took on the task of creating an identity and mission for the interagency themselves.

Stakeholders huddled in a circle and were given 30 minutes to agree on a name for their interagency and to generate a mission statement describing the ethos of what they thought the group could organize around. The System 5 that resulted was:



> BlueNet is an elite law enforcement squad that spans across and unifies the agencies dedicated to countering illicit drug trafficking organizations that threaten our communities, impact the health of our citizens, and pose a real national security threat to the nation. Joining forces and leveraging from our collective knowledge, experience, and resources, BlueNet will unravel the complexities of drug trafficking operations while protecting personal rights. We pledge to relentlessly counter their illicit activities from source to

street corner.

The group fully embraced BlueNet and all agreed that it was important to be equally loyal to BlueNet as to their home agency. They were also enthusiastic about how BlueNet was overarching and that they would love to be able to bring their home agency resources to this joint effort. One of the stakeholders said "I like the mission statement and everyone taking the larger picture into mind at all times. Bringing forth your own agency's perspective, but in a holistic/mission-above-all-else way". BlueNet was also adopted as the name we would continue to use for the interagency being designed.

*Delineating BlueNet Local Environments*

The next task was for each stakeholder to delineate their own local agency environments within the overall VSM environment, which was represented by the large printout of the common systemic perspective map hung on the wall. Each stakeholder was assigned a unique color and was given masking tape of that color to identify all elements and interdependencies on the systemic perspective map in which their agency actively engages. Then, with sticky notes of their assigned color, they were asked to identify their current activities to attenuate and amplify variety (Ashby, 1968) as they impacted on their local environments. Figure 8 is a photograph of the common systemic perspective map after stakeholders delineated their local environments and indicated where they are attenuating and amplifying.
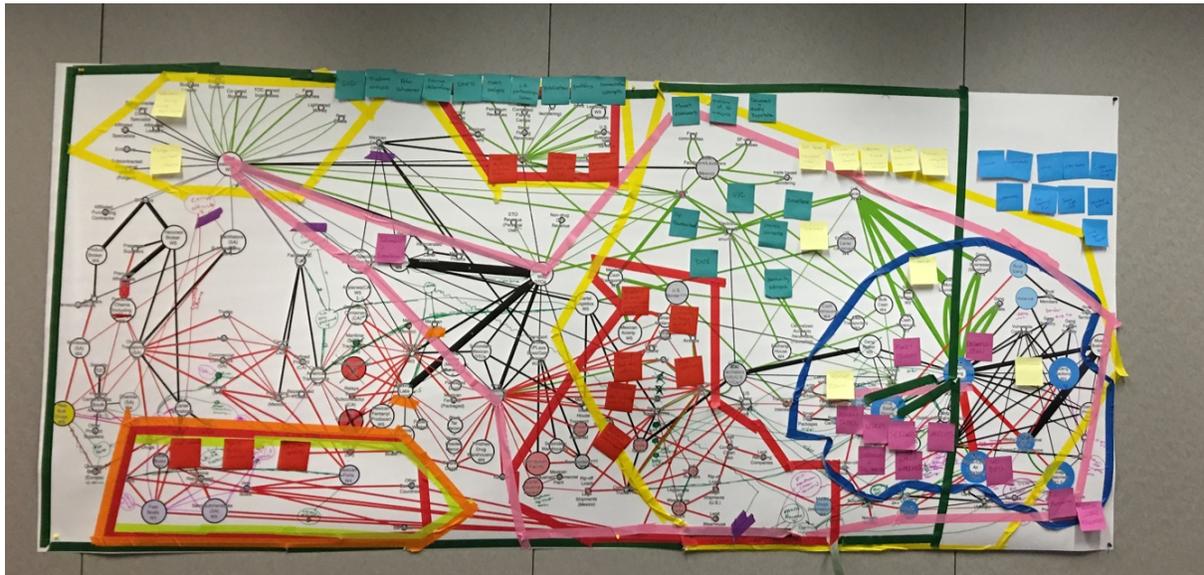


**Figure 8: Local environments delineated on the common systemic perspective map**

*BlueNet System 1*

The playing pieces for the VSM game were poker chips, and stakeholders were given a chip of their assigned color for every attenuation/amplification they identified. They were then asked to read to the rest of the group what each chip represented before placing the chips within their

System 1 circles (see Figure 9). Many of these chips represented data collected about their local environments. Other chips represented operations being conducted to amplify their effects on the illicit drug trade. Other system 1s that were not participating were represented by writing them down next to the game board.
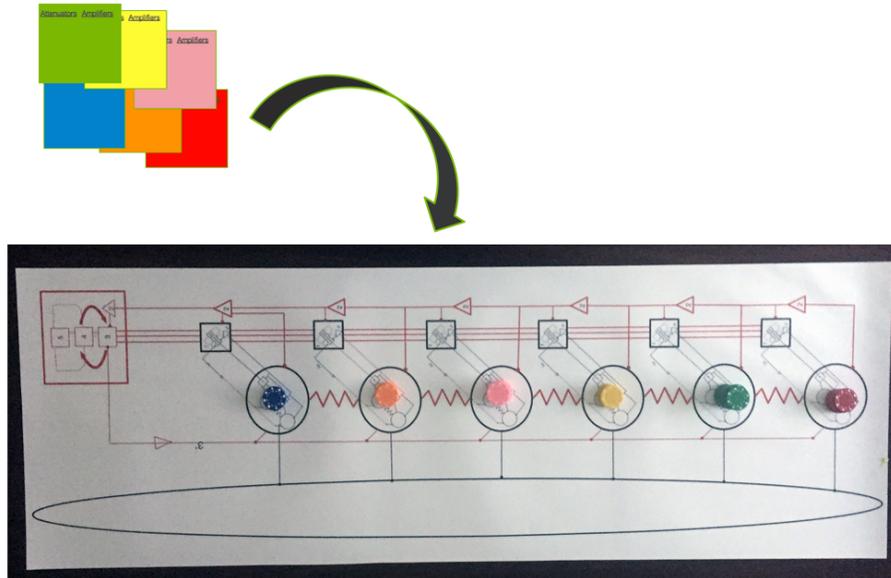


**Figure 9: System 1s with chips to represent data/knowledge obtained through attenuation and amplification**

*BlueNet System 2*

In designing the S2 function for BlueNet, mechanisms and channels for sharing the knowledge/information gained through attenuation activities between agencies were discussed. Because some existing channels already exist, chips representing that information were placed into the channels on the game board and descriptions of those mechanisms were noted (Figure 10). With the chips that remained in S1 circles, stakeholders were asked "what information/knowledge about the environment or other S1 operational activities would be beneficial to your agency?" This generated a lot of discussion, resulting in a stated desire by all stakeholders that they would "take what they could get".
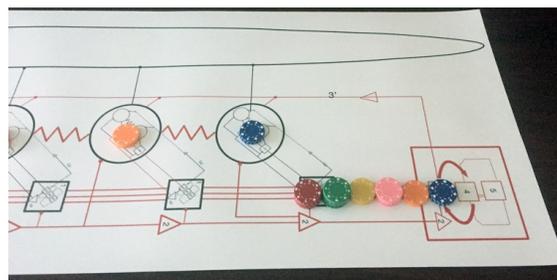


**Figure 10: Photograph showing sharable knowledge/data being pushed through communication channels to S3**

For BlueNet, S2 has two roles. It is the infrastructure that enables knowledge flows through the channels (information systems, interagency meetings, or informal communications among agency staff). It could also have the role of de-conflicting multiple S1 operations co-occurring in space and time, which keeps law enforcement activities from interfering with each other.

Stakeholders recommended options for S2 that ranged from low difficulty and relatively low cost solutions to those that were more challenging and more expensive. For some information, it was simply a matter of including cross-agency access to existing mechanisms. For other information, where no existing mechanisms existed, ideas were put forth on how those mechanisms might be developed. Some information contained personally identifiable information (PII) and the agency representatives recognized that sharing it would require effort and/or technologies that could strip out PII. For sensitive or classified information, all recipients would need to hold appropriate security clearances and specialized secure information systems would need to be in place in order to facilitate sharing.

For those S1 chips that represented amplification activities, the discussion centered around the S2 mechanisms for cross-agency teaming that were already in place. Some of the amplifiers identified in the local environment exercise included existing targeted task forces, cross-agency investigations or collaborations with foreign partners. Recommendations were generated on how these existing amplification mechanisms could be leveraged in a more integrated and more holistically managed manner. This led to a dialogue about S3.

*BlueNet System 3*

S3 is the role that manages the immediate activities of the S1s and supervises S2. It deals with the interagency budget, resource allocation, and other general issues (Beer, 1985, p.65). S3 must work very closely with S2 to balance the complexity of the interactions of each agency with their local environment and the complexity of the interactions among agencies. This relationship is central to achieving effective interagency/whole-of-government cohesion. It is also key to providing continuous self-organization as the wicked problem environment changes over time.

Designing the S3 makeup and function represented a real challenge. All the stakeholders felt strongly that, at the operations level, they wanted to collaborate with other agencies. They remarked that they typically get that collaboration done through their own networks and using what they called 'I know a guy' methods. When asked about potential BlueNet S3 constructs and responsibilities, two main recommendations emerged. One was to take an existing fusion center, task force or other coordinating function and build it out to be a S3 that can cover the entire problem space. The other (and preferred) recommendation was to develop a committee-based S3 that is made up of operational representatives from all the agencies. They suggested that the committee assignments should be full time and last at least a year, but no more than 2 years. This would give committee members the ability to focus on BlueNet, but not so long as to lose touch with their original agencies.

Another important suggestion was to have S3 'own' the common systemic perspective map to provide a continuously updated account of the current environment for BlueNet. S3 would continuously update the map with the information shared by S1s as they intervene in, and/or collect data and develop knowledge on, the wicked problem environment. The common systemic perspective map should, in turn, be shared back to S1s with alerts when changes have been made. This continual cycle of S1 attenuation/amplification and S3's frequent communication back to S1s would provide BlueNet with the kind of situational awareness it needs to try to keep up with a rapidly changing and evolving environment.

*BlueNet System 4*

S4 is the facilitating mechanism by which BlueNet can adapt by anticipating future scenarios and suggesting ways to respond to that variety through new internal organizational developments. In conjunction with S3, it creates the strategic decision-making space of the organization (Hayward, 2004). For an organization to be viable, a strong S4 is obviously enormously important, especially for an interagency collaboration fighting a wicked problem that is as dynamic as the organized crime system. Yet, in his various books, Beer does not provide much guidance as to how S4 can fully comprehend the complexity of the environment, let alone anticipate potential changes to it.

Within BlueNet, the individual agencies (S1s) already have a rich set of methods and technologies for anticipating what may happen in the environment. They use techniques such as data analytics, trend analysis, forecasting, and modeling and simulation. Most often, these techniques are driven by the information generated within each S1 and the output is not widely disseminated among all agencies. Given the importance of S4 to anticipating changes in the whole environment, stakeholders recommended that BlueNet would need a mechanism to leverage these agency-specific techniques and identify gaps where new methods need to be developed.

However, S4 cannot enable organizational adaptation alone. It must have continuous interplay with S3, which has the ability to direct operational change. Nevertheless, there may be resistance to this change. The role of S3 is mostly to work with S2 to 'put out fires' and keep the system running smoothly, while S1s are under constant pressure to maintain effective business-as-usual operations, especially when budgets are tight. This is the reason organizations spend an inordinate amount of time and resources on S3 functions, countering resistance to change, which frequently sucks resources from S4, weakening or eliminating it entirely (Hilder, 1995). For BlueNet, stakeholders realized that they needed a strong S4 and a tightly coupled S3/S4 interaction. We would add that the participative engagement of S4, S3, S2 and S1 personnel in workshops using problem structuring methods can build a collective understanding of the need for change and commitment to making it happen, therefore developing resources for S4 that are conventionally tied up with fighting resistance to change.

One recommendation that the stakeholders suggested was that a S4 function be created to ingest the multiple forecasting feeds being produced by the S1s (Figure 11). In addition, if the S4 could assimilate these forecasts and use them to create future what-if versions of the common systemic perspective map, the interplay between S3 and S4 could provide an effective visual process for mapping which S1s would be affected by the anticipated changes and negotiate with them on how to respond. For gaps in the common perspective map that are not addressed by current techniques,

new techniques would need to be developed so that the S4 is as proactive and anticipatory as possible.
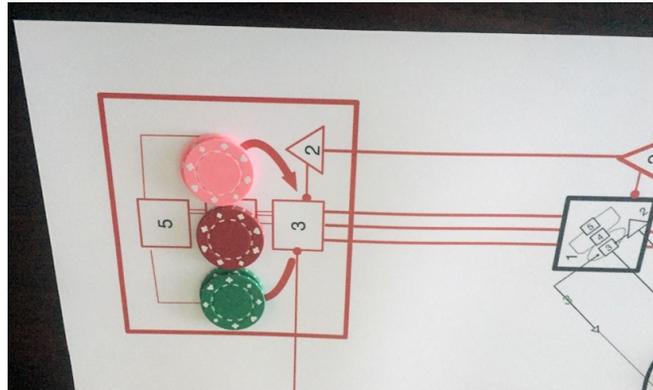


**Figure 11: Photograph of S1 with chips representing S1 anticipation capabilities**

The BlueNet S4 role proposed by stakeholders could be filled by a strategic team that creates what-if future systemic maps and regularly meets with S3 to discuss how these changes could impact operations. The group also conceived how some of this function could be automated. For the latter, S3 would be responsible for implementing the 'S4 automated system' and would use its outputs to decide on the necessary operational changes. However, this 'solution' would reduce the S3/S4 tension between current and future requirements that is necessary for human beings to reflect on in order for them to make sound strategic decisions. S3 may be reluctant to make adaptive changes because of cost or risk. Human beings are needed with S4 roles to present counter-arguments for why internal changes may be necessary in order to maintain viability in the face of anticipated external changes. These external changes could either be threats to the viability of BlueNet or potential opportunities that could be missed if the interagency fails to internally adapt. It is through negotiations between S3 and S4 that the interagency can adapt to rapid changes and sustain viability over time.

*Reflections on the VSM Design*

Before starting the VSM workshop, the stakeholders lamented that they seldom had sufficient time to make a strategic assessment of what other agencies do to anticipate alternative future environments, so they felt that using the VSM was a welcome exercise. They very much appreciated how the VSM helped them identify overlap among the various agencies and encouraged thought on how a whole-of-government interagency organization should align itself to help address the threat of organized crime. There was excitement about how this exercise, done for real (rather than just within the context of a research project), could help to de-conflict multiple operations co-occurring in space and time, which is a very important requirement in law enforcement. Often, overlap is seen as a negative; but when viewed more holistically, overlapping areas were also seen in our exercise as potentially rich areas to find synergies and, where pooled, efforts could result in bigger impacts.

During the frank discussions stakeholders had about barriers to sharing information, the group found that these were largely *perceived* barriers and were often based on assumptions that were not necessarily true. In some cases, the group was able to identify new, relatively low budget, practical solutions to improve sharing and situational awareness. For example, simply giving a few Chicago law enforcement officers higher level clearances, or giving another agency login access to databases, was possible. In other cases, security policies or trust issues among agencies may be the problem, and would need to be addressed. Finally, it was recognized that some solutions would require substantial funding to fundamentally change information system configurations to provide easier sharing. But even with these challenges identified, stakeholders commented that they have never had this level of conversation about the real needs for information sharing that could drive the justification for changing policies or requesting further funding.

Stakeholders also valued the ability to design BlueNet themselves and not have a structure imposed on them. They liked the way that no one agency was seen as the lead, and that they could freely voice their opinions and agree on the rules and protocols they could all follow. They really liked the adaptation that they envisioned through the S3/S4 collaboration. However, there was some concern about the cost of hiring sufficient staff to adequately equip S3 with the ability to maintain the system and for S4 to generate maps of alternative futures.

They also began to see their own agencies as recursive Viable System Models. Interesting conversations emerged around which 'sub-system' they each saw themselves in. Some conveyed how they felt they were in two sub-systems simultaneously, sometimes being a S1 and other times a S3. They also discussed how some sub-systems were not working well within their agencies, or in some cases were missing altogether.

Figure 12 is a diagram of the entire VSM design. BlueNet (S5) has an ethos and mission statement and is embedded within the environment. Each S1 is attenuating and amplifying in relation to its local environment, and there is continual knowledge gathering about what is going on. External disturbances and interagency interventions will cause the illicit drug trade to adapt and change. The knowledge that can be shared is pushed up to S3 through communication channels using protocols and mechanisms provided by S2, which can also perform a de-confliction role. System 3 serves as the management function for the operations, and holds the current situational awareness for the 'here and now'. S4 is the anticipation function that receives information about possible futures produced by the S1s, and may perform its own anticipatory analyses. S4 holds the future systemic perspective map(s), reflecting potential changes to, and adaptations of, the illicit drug trade environment. The current systemic perspective map maintained by S3 and the future systemic perspective maps held by S4 can be used together to make strategic decisions about how operations might need to adapt to prepare for change.
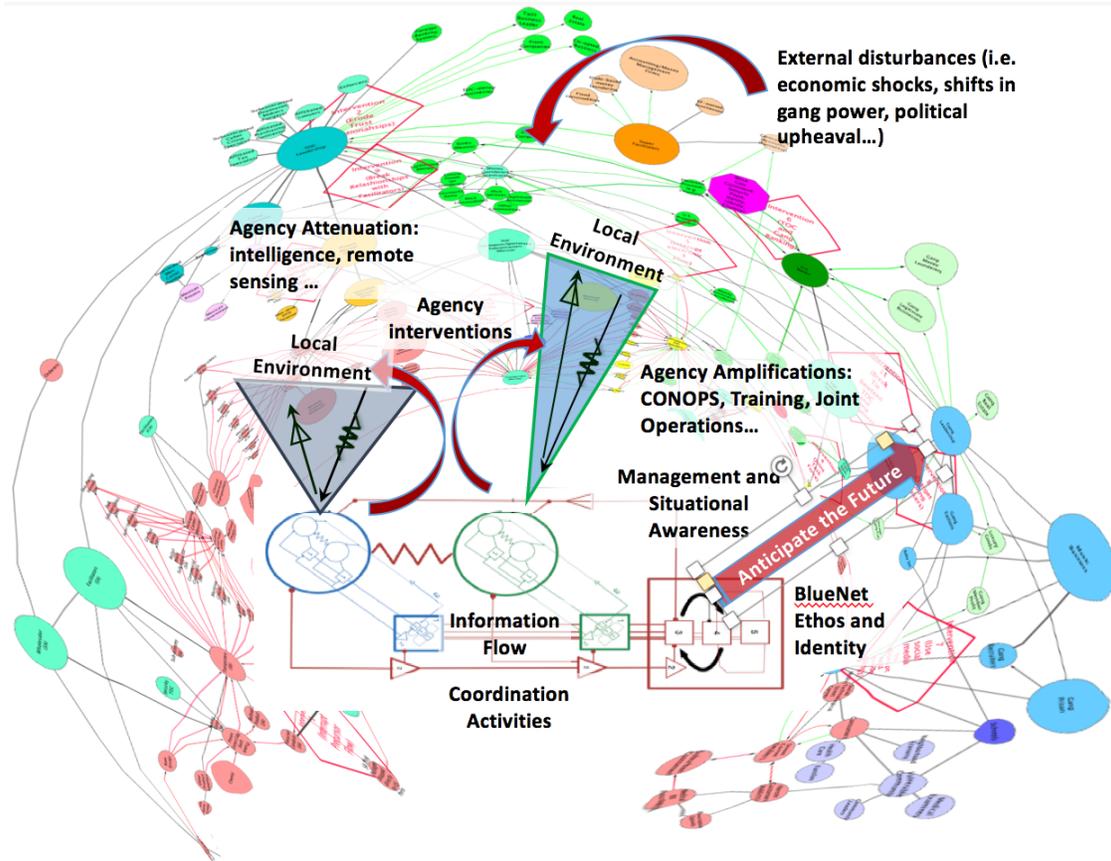
**Figure 12: Diagram of VSM BlueNet Interageency Design**

## DISCUSSION

The desired outcome of the research was to establish a new Systemic Intervention set of methods that could be used to create interagencies as complex systems designed around specific wicked problems. The systems methods chosen for this Systemic Intervention approach were boundary critique, Systemic Perspective Mapping, and the VSM.

Following an initial boundary critique undertaken by the research team to frame the project and select stakeholders, systemic perspective mapping was deployed with those stakeholders to generate deeper holistic understandings of the wicked problem of organized drug crime from single agency perspectives. Boundary critique was then used to support the participants in moving toward a common understanding of the wicked problem, making sure that conflicts between perspectives and decisions on problem elements and interrelationships were thoroughly discussed. Priority options for intervention were also identified. The VSM was then chosen to build on the common understanding of the wicked problem and help the participants design an interagency organization that could effectively oversee implementation of the intervention options, plus new developments into the future. Figure 13 depicts the entire Systemic Intervention approach to designing

interagencies that can respond to wicked problems, and the research that was conducted to evaluate it (observations, debriefings and questionnaire returns) indicates that it has a great deal promise.
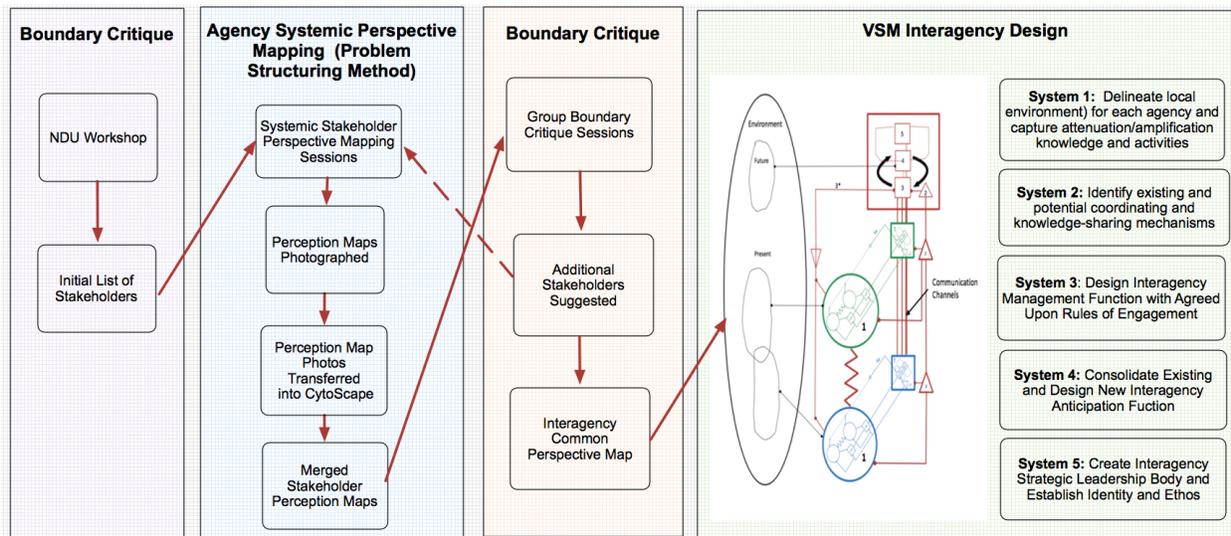


**Figure 13: Systemic Intervention Approach to Designing Interagency Responses to Wicked Problems**

The feedback provided by the participants indicates that this new systemic approach was highly effective in designing the interagency. Their feedback was overwhelming positive, with everybody saying the whole exercise was "very useful" (the top grade out of five options). All felt strongly that real trust relationships had been built, as well as a sense of teamwork with other agencies. They strongly emphasized the extensive mutual learning that came from working together through the process, but wished they could have spent more time really delving further into each part of the exercise.

Some stakeholders expressed interest in inviting their most senior leaders to participate in further design efforts. They thought that, by bringing them in, the approach could be tested within increased constraints that might arise around the political climate, aversion to change, cultural differences among agencies, and budget impacts. The participants all expressed the desire to include more key stakeholders and felt that adding them in future would improve their ability to more comprehensively understand the problem and better design effective future interventions. A concern, however, was the amount of time that would be needed to achieve strategic interagency success, and of course all the agencies are under pressure to demonstrate delivery against targets that are often determined by political election cycles. Our response to this, given what was accomplished in our study, is that it seems reasonable to believe that scaling up this approach would not require an inordinate amount of time, especially as 'quick wins' could no doubt be obtained through information sharing and improved coordination. Sustaining the interagency would then require continued monitoring and updating of the systemic perception map, maps of possible futures, and the responsiveness of the VSM subsystems.

The Systemic Intervention approach described in this paper was developed specifically to include systems methods that address many concerns about achieving interagency success head-on. The participant feedback illustrates the ability of the new approach to (1) be inclusive of all necessary agency perspectives, as long as these agencies are willing to participate; (2) directly tackle conflicting agency views: (3) reduce imbalances in power and influence through active facilitation; and (4) provide a non-hierarchical design for creating interagency structures and communications that are highly cohesive and adaptive. If successfully implemented in real policy and practice projects, this research suggests that the approach could provide an agile way to more quickly organize government resources around wicked problems without the need to dismantle or otherwise reorganize existing agencies and programs.

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