A SYSTEMIC INTERVENTION APPROACH TO DESIGNING INTERAGENCY RESPONSES TO WICKED PROBLEMS: CREATING A COMMON, CROSS-AGENCY UNDERSTANDING

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ABSTRACT

Wicked problems are open-ended, highly interdependent issues that cross agency, stakeholder, jurisdictional, and geopolitical boundaries. In response, there has been advocacy for interagency working. However, this confounds conventional approaches to government because policies and budgets tend to be aligned within organizational boundaries and not across them, making it difficult to bring the appropriate talent, knowledge and assets into an interagency approach to tackle the interdependencies of whatever wicked problem is at hand. In addition, the purposes, perspectives and values of the various government agencies and other stakeholders can often be in conflict. This is one of a pair of papers reporting on research to develop and evaluate a systemic intervention approach involving the use of multiple methods underpinned by boundary critique to address a wicked problem. In this first paper, the major focus is how to create a common understanding of a wicked problem among multiple agencies using a participatory problem structuring method called 'systemic perspective mapping'. The wicked problem we tackled was international organized drug crime and its intersection with local urban gang activity (using Chicago, USA, as a representative city). Perspectives on the problem were structured with participation from various local, regional and federal agencies involved in countering illegal drug trafficking. Our research found that the combined use of boundary critique and systemic perspective mapping was able to generate enough of a common understanding to provide a foundation for the design of an interagency organization using the viable system model (the latter is reported in the second paper).

Keywords: Problem structuring methods, OR in government, systems thinking, interagency, wicked problems

1. WICKED PROBLEMS

The term 'wicked problem' was first used by Rittel & Webber (1973) as a way to characterize multi-stakeholder planning issues that are dynamic, highly complex, interact with other issues, and involve stakeholder conflict. Most decision makers find it frustrating is that there are no definitive and objectively-best answers to wicked problems.

Complex wicked problems are beyond complicated because diverse 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 (Checkland, 1985). Camillus (2008) and Friend & Hickling (2005) warn that trying to solve wicked problems with traditional approaches used for complicated problems can lead to unintended negative consequences because of interactions with other issues and decisions. Unintended consequences often happen because many traditional OR approaches unknowingly privilege one perspective in the belief that it is objective while marginalizing others, leading to conflict down the line (Checkland, 1981; Midgley, 2000; Spash, 1997).

1.1 Wicked Problems in Public Policy

While not all policy problems are wicked, many are, and they may fall into the public domain, or more frequently require multi-sector, synergistic engagement (e.g., bringing together public-, private-, voluntary- and/or community-sector organizations, often working at different scales). Wicked problems present some of the most important challenges of our time. Examples of wicked problems include (but are certainly not limited to) climate change (Ison, Collins & Wallis, 2015; Lazarus, 2009; Levin, Cashore, Bernstein, Auld, 2012; Moser, Jeffress Williams & Boesch, 2012), pandemics (Cankurtaran & Beverland, 2020; Connolly, 2015; Moon, 2020), health care for aging populations (Braithwaite, Runciman & Merry, 2009; Westbrook, Braithwaite, Georgiou, Ampt, Creswick et al., 2007), and energy security (Chester, 2010; Sydelko, Ronis & Guzowski, 2014).

Policy makers struggle with wicked problems because of their desire for simple short-term solutions, so they frequently fail to take the time to adequately understand the problem (Australian Public Service Commission, 2007; Head & Alford, 2015; Rittle & Webber, 1973), and they often prioritise existing 'deliverables' rather than engage in a rethink of what is needed (Ison, Alexandra & Wallis, 2018). Also, they generally find it difficult to escape the culture of top-down decision making, where a few people with an inadequate understanding of the complexity have the authority to mandate action, and this is uncontested within their organizations, but contested by other agencies (Anderson, 2014; Roberts, 2000). In the absence of adequate understanding, decision makers often end up relying upon ideological judgments, and are also prone to succumb to external pressures, particularly to restrict the allocation of time, money and patience (Rittel & Webber, 1973).

Recently, the concept of *super-wicked problems* has been introduced. Much of the focus on super-wicked problems seems to stem from frustration over the short-sightedness of policy makers in combating global issues like climate change (Lazarus, 2009; Levin et al., 2012). The term 'super wicked' was first used by Levin, Cashore, Bernstein & Auld (2009) in their paper calling for an applied forward-reasoning approach to environmental problems (like climate change) that have contingency, uncertainty, and long time-horizons. Lazarus (2009) explains that climate change is defined as a super-wicked problem, not only because the climate science says there is an issue of concern, but also because of the nature of lawmaking institutions that seem unable to formulate an appropriate response to this science, at least in the US. Levin et al. (2012) say that super-wicked problems have four properties over and above a 'normal' wicked problem:

(1) A sense of urgency and/or a feeling that time is running out;
(2) Those looking for solutions are actually responsible for creating the problem in the first place, or allowing it to emerge, and might want to hide this fact;

(3) The institutions needed to address the problem are weak or non-existent at the appropriate scale; and

(4) Irrational discounting occurs that continually pushes responsibility for acting into the future.

Levin and colleagues believe that, together, these features describe the tragedy of our governance institutions and the policies they generate, or fail to generate (also see Ison, 2018, and Ison and Straw, 2020, for some ideas on how climate governance could be improved through systems thinking).

This recent interest in super-wicked problems is reminiscent of the Club of Rome, which was formed in 1968. Its founders set out to foster an understanding that the global system is made up of interdependent economic, political, natural, and social components, which have to be addressed together systemically. Laouris & Michaelides (2018) explain that, in its original vision, the Club of Rome (1970) was strongly focused on the democratic participation of the world's population in formulating both an understanding of the predicament of humankind and potential ways forward, although later it refocused on more technical, expert-led modeling of the interactions between an array of global issues (e.g., Meadows, Meadows, Randers & Behrens, 1972). The Club of Rome's term for the complex of interacting problems that were common to all nations was the *world problematique* (now most often called the 'global problematique'), which included highly intractable issues such as poverty, environmental degradation, urban sprawl, unemployment, and the alienation of youth. Like super-wicked problems, the world problematique was described as having such complexity that addressing it was considered to be beyond the capabilities of traditional institutions and policies.

The dynamic nature of wicked problems requires planners and decision makers to be highly adaptive and to change their mindset from 'solving' to 'managing' wicked problems (Rittel & Webber, 1973). This is important because decision-makers cannot expect neat technical solutions, but will instead need to deal with wicked problems through on-going learning and adaptation (Ackoff, 1979; Mingers, 2008; Norton, 2012).

DEVELOPING A SYSTEMIC INTERVENTION APPROACH

Some approaches to managing wicked problems are explicitly based on systems thinking, with a view to creating better (i.e., more systemic) interagency responses (e.g., Coyle & Alexander, 1997; Foote, Taylor, Carswell, Nicholas, Wood et al., 2014a; Foote, Taylor, Nicholas, Carswell, Wood et al., 2014b; Givens, 2012; Ison & Straw, 2020; Midgley, Munlo & Brown, 1997; Taket & White, 2000). Cabrera and Cabrera (2015) argue that systems thinking is useful in the context of wicked problems because it supports critical thinking about taken-for-granted boundaries; gives people tools to explore interconnections between issues; supports the consideration of multiple stakeholder perspectives; and accounts for how the parts of a wicked problem interact to form a whole that is greater (more intransigent, and with emergent properties) than the simple sum of those parts might lead stakeholders to expect.

There are, of course, many different systems methodologies in the literature (see Midgley, 2003a, for the largest collection published to date), and several have been used in the context of wicked problems. For instance, system dynamics computer modeling (Forrester, 1994; Maani & Cavana, 2007) has been employed to explore interactions among the multiple global issues that are currently challenging humanity (He, Okada, Zhang, Shi & Zhang, 2006; Hjorth & Bagheri, 2006; Meadows, Randers & Meadows, 2005; Simonovic, 2002). Causal loop diagramming and qualitative group model building (Vennix, 1996) have also been a particular focus (Chae & Olson, 2007; Hjorth & Bagheri, 2006; Vo, Kwakkel & Pruyt, 2013). A recent example of causal loop modeling that has gained significant attention is Lane, Munro and Husemann's (2016) examination of the systemic failings of the English social work system.

In addition, soft systems methodology (SSM) (Checkland, 1981; Checkland & Poulter, 2006; Checkland & Scholes, 1990) has been used by Checkland and Winter (2006) to redesign the contracting mechanisms for the National Health Service in the UK. SSM is just one of a number of qualitative systems methodologies designed to facilitate systemic analysis and enhanced mutual understanding amongst multiple stakeholders (for others see, e.g., Ackoff, 1981; Ackoff, Magidson & Addison, 2006; Córdoba-Pachon, 2010; Cronin, Midgley & Skuba Jackson, 2014; Flood & Jackson, 1991a; Hirschheim, 1983; Jackson, 2003, 2019; Laouris & Michaelides, 2018; Mason & Mitroff, 1981; Pidd, 1988; Pidd & Woolley, 1980; Rosenhead and Mingers, 2001).

A further example is Midgley Munlo & Brown's (1998) work on improving housing services for older people, which has informed the basic structure of our own approach, as these authors uniquely 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 viable system model (VSM) to support the design of an interagency organization. Espinosa & Duque (2018) likewise combined boundary critique and the VSM to explore issues of self-governance in a multi-agency organization (a Colombian indigenous association in the Amazon).

The research goals of our project were to develop and apply a mixed-methods systems approach to (i) generate a multi-perspective, common interagency understanding of a specific wicked problem, and then (ii) design a tailored, agile, interagency response to manage it. This paper describes how we met the first of these goals (another paper by Sydelko, Espinosa & Midgley, 2021, explains how we addressed the second goal). Our application area was organized drug crime, and especially the interface between international crime organizations and local gang activity: the former recruit from the latter, and therefore local gang members are encouraged to engage in escalating amounts of violent crime to prove themselves to the international recruiters.

To address both goals, 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 there are very few wicked problems where one method can do everything we might need (Flood & Jackson, 1991b; Flood & Romm, 1996; Jackson, 2019; Mingers & Gill, 1997; Midgley, 2000; Taket & White, 2000). Finally, the framework would need to help participants deal with boundary judgments through focused dialogue, given the different concerns of the participating agencies.

Midgley's (2000) systemic intervention approach was selected for this research because it addresses all of 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, 1991a) but do not put the exploration of boundaries up-front. See Midgley (2000), Midgley and Shen (2007) and Ulrich (1993, 2003) for critiques of multi-method approaches that do not explicitly address boundary questions.

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 themes from the literature on critical systems thinking: methodological pluralism (sometimes called multi-methodology) and boundary critique. Each of these is explained in turn below, and this is followed by some references to practical examples.

Methodological pluralism focuses on the need to draw upon insights and methods from a rich diversity of other methodologies, and to creatively design a tailored approach that responds to the requirements of the unique intervention context at hand (also see Bowers, 2011; Flood, 1990; Gregory, 1996a, 1996b; Jackson, 1991, 2000, 2003, 2019; Jackson

& Keys, 1984; Midgley, 1992a, 1996, 2001, 2016a; Mingers & Brocklesby, 1997; Mingers & 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 (Midgley, 2000; Midgley, Nicholson & Brennan, 2017).

It is important to note that a mixed-methods design is more than the sum of its parts (Midgley, 1997a), in that each aspect of the intervention is strengthened by the other aspects. The systemic problem structuring we present in this paper helped the stakeholders develop a common, interagency understanding of the wicked problem, but it was using the viable system model (VSM) (Beer, 1984) to design an organizational response (reported in Sydelko et al., 2021) that helped them see how they could move from an improved understanding to action. Better understanding of the current situation alone is often insufficient to enable beneficial change. However, if we had gone straight into a VSM analysis, it would have been weakened by an inadequate appreciation amongst the participants of the complexity they were facing. A high-quality organizational design on its own is likewise usually insufficient to address a wicked problem: it is important to exploit the *synergies* that can be obtained from mixing methods to support intervention (Midgley, 1997a, 2000).

The vast majority of work in the systems thinking and OR literatures on methodological pluralism, multi-methodology and mixing methods focuses on principles, frameworks and processes for exploring the context and either choosing an appropriate 'off the shelf' approach (e.g., Jackson, 1991) or designing a bespoke combination of methods that responds to the unique features of the situation (e.g., Midgley, 2000). There has been less of a focus on identifying relatively stable combinations of methodological ideas or methods that can be used *across* contexts, or to address a *variety* of wicked problems. This is a specific contribution of our paper: identifying and testing a combination of boundary critique, problem structuring and viable system modelling that we believe has the potential to be used whenever there is a need to accomplish three different things within a single intervention: explore whose voices should be heard and what should be included in the problem/solution space; enable individual and collective learning about how multiple features of the problem interrelate to create the 'wickedness' people experience; and organize in an interagency manner, working across boundaries, to enable a coordinated and adaptive policy/practice response. While there is obviously a limit to what should be claimed for a methodological approach based on a single application (Checkland, 1981; McAllister, 1999; Midgley, Cavana, Brocklesby, Foote, Ahuriri-Driscoll et al, 2013; Rowe & Frewer, 2004; White, 2006; Yearley, 2006), this paper and Sydelko et al (2021) are intended to form a platform upon which a larger, ongoing research program can be constructed.

Mixing methods and learning from other methodological approaches may be necessary aspects of methodological pluralism (Midgley, 2000), but actually the wrong methods may be chosen if the practitioner's initial understanding of the wicked problem (prior to systemic problem structuring) is misleading (Midgley, 2000; Ulrich, 1993): there is also the need for an up-front, penetrating exploration of the context of the intervention, even before problem structuring, 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 (Foote, Gregor, Hepi, Baker, Houston et al. 2007; Midgley & Richardson, 2007). This kind of exploration is often called 'boundary critique' (Midgley et al., 1998; Midgley & Pinzón, 2011). It builds on the previous work of Churchman (1979a, 1979b), who describes an 'unfolding process' for OR projects, which includes the consideration of different viewpoints and the 'sweeping-in' of as many factors as possible into systemic analysis, but without compromising intelligibility through over-inclusion. Particularly relevant to this 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 can agree through dialogue is reasonable – and when this is not possible, decision makers should 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, 2016a; Midgley & Pinzón, 2011, 2013; Pinzón & Midgley, 2000) and marginalization (Midgley, 1992b, 1994, 2000) is particularly important.

Using boundary critique prior to creatively designing a mixed-methods systems approach, and periodically again during the process of application, helps to mitigate the problem of basing the design on an insufficiently systemic understanding of the wicked problem (Córdoba & Midgley, 2006). A variety of researchers have used this systemic intervention approach for actively creating improvements in problematic situations (e.g., Barros-Castro, Midgley & Pinzón, 2015; Boyd, Brown & Midgley, 2004, 2007; Córdoba & Midgley, 2003, 2008; Espinosa & Duque, 2018; Foote, Gregor, Hepi, Baker, Houston et al., 2007; Foote, Hepi, Taimona, et al., 2007; Foote, Midgley, Ahuriri-Driscoll, Hepi & Earl-Goulet, 2021; Gregory, Atkins, Midgley & Hodgson, 2020; Helfgott, 2018; Midgley, 2006, 2015, 2018; Midgley, Ahuriri-Driscoll, Shen & Midgley, 2007, 2015; Morgan & Fa'aui, 2018; Pinzon-Salcedo & Torres-Cuello, 2018; Ufua, Papadopoulos & Midgley, 2018)

3. A SYSTEMIC, INTERAGENCY APPROACH TO STRUCTURING PERSPECTIVES ON THE PROBLEM OF THE ILLICIT DRUGS TRADE

The wicked problem chosen for this research was the illicit drugs trade and trafficking into US urban centers. This exemplifies an extremely wicked and dynamic problem because it lacks precise formulation, involves multiple stakeholders with differing perspectives, exhibits extensive interdependencies, and is resistant to traditional linear approaches to solving it. As an example, some policies have focused on the illicit drugs trade as a domestic demand-side law enforcement issue (Levin, et al., 2012; Moore & Elkavich, 2008; Schoenfeld, 2012), but this approach is largely seen as a failure because it has not reduced the use of drugs. Also, in the US, it has involved mass incarceration and the removal of parents (mostly fathers) from predominately poor and African American families, with knock-on effects in terms of poverty, family breakdown and criminality (Western & Wildeman, 2009). Another perspective is to view the illicit drugs trade as a national security supply-side issue, with a focus on interdiction, eradication, and combating drug-trafficking organizations in producer countries (Andreas, 2003; Falco, 1996). Yet another is to view illicit drug trafficking through the lens of public health (National Drug Intelligence Center, 2016), with a heavy emphasis on curtailing easy access to prescription opioids, which have had the unintended consequence of being 'gateways' to more potent black-market opioid alternatives, including heroin (Alpert, Powell & Pacula, 2018; Beletsky & Davis, 2017; Cicero, Ellis, Surratt & Kurtz, 2014).

Given the diverse aspects of the illicit drugs trade, and the fact that there are many perspectives on it, we find that responsibilities for action on this wicked problem have been divided up between multiple government departments and agencies, each with their own mission-oriented lens. These agencies span numerous local, national and international divides. Although there are collaborative efforts between agencies, as far as we are aware, nobody in the US 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 organization. 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 (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, and (2) development of a problem structuring method to generate a common, systemic understanding of stakeholders' perceptions of the wicked problem. The subsequent use of the VSM (Beer, 1984) to design an interagency organization is presented separately (Sydelko et al., 2021).

3.1 The Initial Boundary Critique

Boundary critique is a core idea in the social theory and methodology of Critical Systems Heuristics (Nicholas, Foote, Kainz, Midgley, Prager et al., 2019; Midgley, 1997b; Ulrich, 1983, 1987, 1996; Ulrich & Reynolds, 2010), and is also a foundational part of systemic intervention (Midgley, 2000, 2006, 2015; Midgley et al., 1998; Midgley & Rajagopalan, 2020). The theory of boundary critique is important for systemic intervention because it focuses on stakeholders' purposes and values, and how those values are intimately linked to 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, 2016a; Midgley & Pinzón, 2013).

After successfully receiving ethical approval from the Business School Ethics Committee at the University of Hull to progress with the proposed research, we started our boundary critique. This began prior to stakeholder selection. The research team discussed their own attitudes to illegal drugs, the drugs 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 (Alrøe, 2000; Midgley, 2000, 2003b, 2008; Ulrich, 1983), 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 drugs trade are worthy of intervention, and we also agreed that there might well be much better ways of addressing them than current US 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 with a stake in perpetuating the harms that stem from the drugs trade would have been counter-productive: our experience told us that none of the representatives of public sector organizations would have been 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 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 US drug policy circles for their knowledge on illicit drug trafficking. This workshop generated a lot of good discussion, resulting in the generation of a list of suggested agencies that should be included in producing an interagency design. The agencies on the list were contacted to select a representative to participate in the study. A few additional stakeholders were identified during the course of the research, 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 of experience working in the following agencies: the Department of Justice (Drug Enforcement Agency, Chicago High Intensity Drug Trafficking Area); the Department of Homeland Security (Customs and Border Protection, Coast Guard); the Federal Bureau of Investigation; the Chicago Police Department; the Department of Defense (several counter transnational crime entities); and the Department of the Treasury. There were suggested agencies that were not included, mostly because attempts to recruit specific representatives were not successful. These were the Department of State; local, state, and federal public health departments and agencies; others from the intelligence community; additional local government partners; non-governmental organizations; and international agencies from beyond the USA. Although the stakeholders were relatively similar in seniority or rank, special attention was paid during the project to making sure any person who might feel intimidated was encouraged to speak up. This was particularly important for two of the participants, but facilitation encouraged their contributions. Because all the stakeholders volunteered their time to participate, even while they were heavily involved in actively addressing the wicked drug trafficking problem, the time allotted to achieving the goals of the study had to be kept manageable for them. See Helfgott (2018), Hodgson (2013, 2016, 2020), Midgley, Johnson & Chichirau (2018) and Midgley & Shen (2007) for discussions of time management as a boundary critique issue. Overall, the stakeholders dedicated approximately 30 hours each to the project. Only two stakeholders dropped out midway because they could not commit sufficient time.

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

3.2 Individual Stakeholder Problem Structuring

The term 'problem structuring methods' (PSMs) was first coined by Pidd (1988) and Pidd and Woolley (1980) to describe processes used to gain sufficient understanding of the dimensions and symptoms of a problem that lead to the involvement of an analyst and to some sort of formal modeling. Rosenhead (1989) and Rosenhead and Mingers (2001) also use this term, but with reference to a family of methods that are used to gain a shared understanding of a problematic situation where there is a high level of complexity, uncertainty and pluralism of perspectives. It is the latter understanding

of PSMs that is most commonly drawn upon in the literature, and we use the term in this way. PSMs are mostly qualitative and 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). While Franco (2013) advocates the use of models as "boundary objects" (p.720), which stakeholders imbue with their own meanings relevant to their different purposes and contexts, he equally emphasizes the importance of the social interactions that evolve during the intervention. With PSMs, models are used less to 'solve' the problem, and more as 'transitional objects' around which dialogue and improved trust can be constructed (Cronin et al., 2014; Eden & Ackermann, 2006; Eden & Sims, 1979).

There are a number of PSMs in the literature, and we reflected on their strengths and weaknesses before deciding to create our own. Many researchers have found visual modeling approaches to be useful for producing better systemic thinking around complex problems than use of verbal dialogue alone (e.g., Sibbet, 2012). For instance, a PSM to explore stakeholder values through the use of visual aids was developed by Cronin et al. (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) 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 interactions and feedback loops (Forrester, 1994; Vennix, 1996). Causal mapping (Bryson, Ackermann, Eden & Finn, 2004) helps to map elements and relationships, but is limited to probabilistic causalities. While feedback loop methods enable the visual mapping of systemic relationships, they impose cause-and-effect thinking that we felt was too restrictive for describing wicked problems. 'Rich picturing' (Checkland, 1981; Checkland & Poulter, 2006; Checkland & Scholes, 1990) is better in this regard, as stakeholders can capture viewpoints and conflicts as well as interrelationships in their models, but we thought that even this had three drawbacks in the context of our project. 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 several rich pictures into a single model representing an agreed collective understanding. Third, we thought it would be useful if participants could move elements in the model around to experiment with different possible configurations, and the usual pen-and-paper way of doing rich pictures would not allow this.

Furthermore, most PSMs often 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. This can be particularly problematic if stakeholders vary in their seniority and rank, as more junior participants may feel intimidated when senior colleagues forcefully express viewpoints that they disagree with. It was our judgement, having had some experience of stakeholder interactions in our first workshop held in May 2016 (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 a step-by-step, cumulative PSM approach, with interactive boundary critique integrated into it, that we called 'systemic perspective mapping'. This started with individual

interview sessions conducted with each agency stakeholder, so they would not be pressured or intimidated by others. Each participant produced their own systemic perspective map, which was then merged with all the other individual maps before we progressed to a multi-stakeholder session. The PSM sessions with individuals were designed to allow the stakeholders to freely express their purposes and values, capture what they perceived to be the key elements of the problem, and explicitly identify what they saw as the interdependencies between these elements without defining cause and effect. Therefore, when the group was later brought together to engage in dialogue about differing perspectives, all those perspectives were already fully expressed.

3.3 Systemic Perspective Mapping

For the individual stakeholder PSM sessions, we utilized a relatively simple, hands-on method. This is designed to capture a single systemic perspective, and it allows an agency stakeholder (or multiple members of the same agency) to easily add, remove, set aside, rearrange and manipulate the elements and interdependencies as they develop their perspective on the structure of the problem, either alone or in a group. This process is similar to what Wujec (2013) describes in his 'How to Make Toast' video. In addition, our 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 judgements with others.

An important aspect of beginning the "unfolding process" (Churchman, 1979b, p.83) with individuals (rather than the full interagency group) was allowing stakeholders to develop, explore and play with their problem perspectives without having to consider conflicting perspectives from other stakeholders at the outset, and without us imposing boundary constraints. This was an important first step to address the potential for marginalization in future cross-stakeholder interactions, because every stakeholder was given the unchallenged opportunity to describe their own perceptions of the problem. In interagency working, there are often real or perceived issues with power relations (Crawford & Jones, 1995; Midgley & Milne, 1995; Pearson, Blagg, Smith, Sampson & Stubbs, 1992; Sampson, Stubbs, Smith, Pearson & Blagg, 1988) that can result in the marginalization of some agencies in the development of strategies or policies (we believe it is a mistake to assume that only vulnerable and non-professional stakeholders, like children and community groups, are subject to processes of marginalization). Potentially marginalized stakeholders can be empowered through opportunities to develop their own perspectives prior to collaborating with others (Midgley, 1997b). Stakeholders were free to come up with whatever problem elements were pertinent to them, and they were also free to draw relationships and interdependencies where they perceived them to be. In addition to countering potential marginalization, this work with individuals was done to promote divergent thinking, and also (as mentioned earlier) it gave the participants a sense of their inevitably partial knowledge – as they began to explore less-familiar aspects of the problem situation, they were forced to admit to areas of ignorance. We anticipated that this would make them more open minded to other perspectives when we brought the stakeholders together for collaborative exploration.

Systemic perspective mapping captures the problem perspectives of stakeholders by simply using note cards, sticky notes and felt markers. The process initially entailed the facilitation of systemic thinking around the problem by having individual stakeholders directly identify and describe what they considered to be key elements of the wicked 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. Checkland (1981) discusses the value of clearly distinguishing between developing an understanding of the problem situation and proposing interventions: often perceptions of the situation and ideas for action are tangled up, and greater insight into both can be gained by analytically separating them. Therefore, the participants were cautioned to only define what they saw at that time as the wicked problem without jumping to solutions (this was understandably difficult for most of the stakeholders, and required some facilitative interventions). 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, the participants were given the freedom to arrange and group elements if they wished to. They were also asked to assign a weight (1-5) to each of the elements, representing how important to policy and practice it is. They were free to put whatever weight they wanted on these elements, but as a guide we suggested that they assign the highest weight (5) to elements that were a first priority for intervention. Elements of only minor perceived importance were given a 1. Stakeholders then assigned the weights 2-4 to the many elements that lay between these two extremes. The range selected for weights was somewhat arbitrary, but keeping it small (as opposed to, say, 1-100) made it easier for stakeholders to quickly assign an importance level. The participants were allowed to go back and change their weights as their map unfolded. This was necessary because the weighting was started quite early in the process, and as relationships between the elements were added, it sometimes changed people's perceptions of importance. See Dye and Conaway (1999) and Laouris and Michaelides (2018) for discussions of the value of exploring interconnections before prioritizing. In a couple of cases, this weighting was not completed due to time constraints, but there were to be subsequent opportunities to address this (to be explained shortly). We should note that weights were not assigned to enable quantitative analysis, but as a way of capturing priorities for intervention from the individual's perspective. These weights became particularly important later in the group dialogue among all the stakeholders.

Next, participants were asked to use sticky notes with lines or arrows on them to represent the relationships or links between elements. Because we didn't want to force the participants into only representing quantifiable, causal relationships (which could have resulted in the omission of other types of relationship that couldn't be captured as stocks and flows), we mostly left it to the individual to decide whether to use a (single- or double-headed) arrow. In quite a few cases, the participants simply chose to draw a link without any directionality (a straight line with no arrow heads). Sometimes the link required some words of explanation, which were added in response to the question, 'what is important about the relationship?' For instance, the relationship between gang leaders and street corner dealers was delineated by one participant as a key part of the context of the problem, but he saw this relationship as being too variable and complex to represent with a simple arrow. The one exception to our decision to leave the choice of arrows or lines up to the individual was when it came to relationships that were parts of supply chains (either drug flows or money laundering). Here, stakeholders were asked to use single-headed arrows to indicate the direction of flow between elements, as these relationships were fairly well understood. In most cases, stakeholders were asked to weight the relationships from 1 to 5 in order of their importance (as was done for the elements). Again, in a couple of cases, time constraints prevented all the relationships/interdependencies being weighted. When finished, the picture of weighted elements and relationships formed a systemic perspective map of the wicked problem from each stakeholder's point of view.

During the systemic perspective mapping sessions, notes were taken to capture key elements of the dialogue and behaviors of stakeholders. The stakeholders had already made it clear by this stage that they were not comfortable with us recording or videotaping them. However, the final maps for all the individual stakeholders were photographed. After the mapping sessions, each photograph was used to create an electronic version using the Cytoscape software package (Cytoscape, 2017). Figure 1 illustrates two example photographs (from a larger set) taken of one stakeholder's systemic perspective map and the corresponding Cytoscape image that was created from it.

Cytoscape was chosen because it is a free and open-source software package for mapping nodes and links, is easy to learn and use, produces a dataset that can be edited and exported, and provides the ability to merge individual maps into new, more comprehensive maps representing the start of a collective understanding. To ensure that the electronic versions were accurate representations, an iterative process was used to allow stakeholders to make corrections or add more information, such as additional weightings if the time constraints in the PSM session had not allowed for this step to be completed. In Figure 1, node sizes represent the weights 1-5 (smaller to larger). The red links represent drug trafficking and the green represent the money laundering parts of the problem (both are supply chain elements with directional arrows).
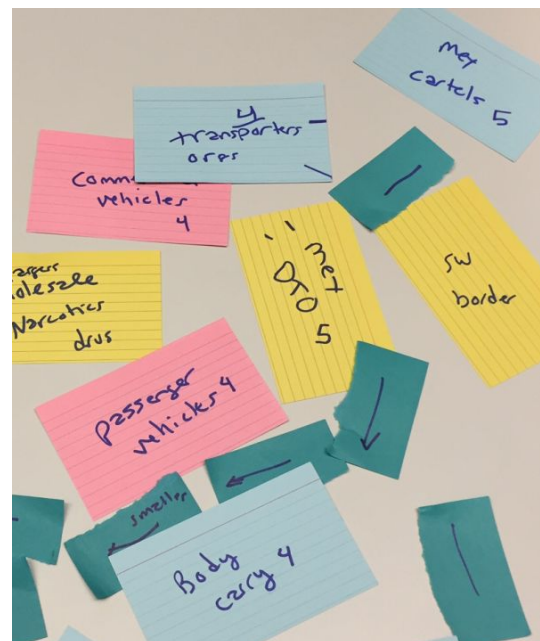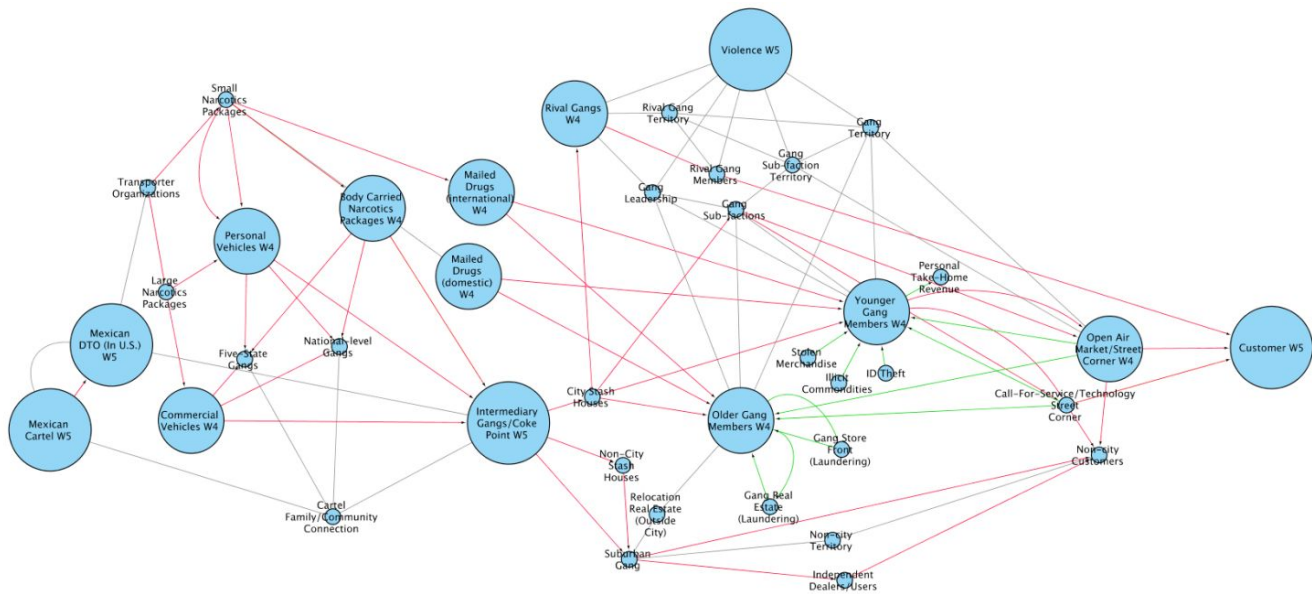
Figure 1: Example photographs from an initial stakeholder problem structuring session and the systemic perspective map associated with them.

All 13 stakeholders who participated in these sessions using systemic perspective mapping were sent a questionnaire asking for their feedback on the process. Nine stakeholders responded, and 8 of them rated the PSM sessions as 'very useful' (the highest rating on a scale of 5). Many said that they felt they were already systems thinkers, but had never used this term before. They liked the way systemic perspective mapping helped them to "download" their thoughts, and they said that it "jogged their memories" to identify elements that they did not include at first. They also felt it gave them the ability to openly and honestly express their viewpoints without the pressure of having other agencies present, which several acknowledged could have been marginalizing. Clearly, the longer-term goal was going to be to work together towards 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 perspective mapping as a two-stage process, involving individual mapping before bringing people together in a group.

Stakeholders overwhelmingly remarked on 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 who/what are the main entities"; "The process allowed me to take the time to look at my role when addressing the problem"; and "it helped convey the intricacies of the gang culture. It's more than drugs and turf".

The average time for the in-person session was 90 minutes. When scheduling these meetings, the agencies and their representative stakeholders were sensitive to the time they would take away from their duties. However, after the sessions were completed, many stakeholders indicated that they would have liked *more* time to really explore the problem space. One person wondered if using the mapping software directly with stakeholders would have reduced the length of the sessions, but the time it would have taken even a tech-savvy stakeholder to become familiar with the software would likely have prolonged the meetings instead of reducing them. Additionally, we feared that introducing 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.

A Cytoscape merging function was used to integrate all the individual systemic perspective maps, including all the elements and interdependencies (some with directional arrows and some without), as well as their weights. A similar approach was used by Eden and Ackerman (1998) and Eden and Huxham (2001) when merging cognitive maps. Cytoscape produces a messy merged map that we then needed to arrange to reveal redundancies, inconsistencies and conflicting weights. No elements or interdependencies were removed or changed during this process. Figure 2a shows the merged map. Figure 2b shows enlarged views of parts of the map to make some of the detail clearer.

Figure 2a: The merged systemic perspective map formed by integrating the maps from individuals

Figure 2b: Enlargements of the merged systemic perspective map to show more detail.

3.4 Further PSM and Boundary Critique Workshops to Create a Common Systemic Perspective Map

Each of the individual systemic perspective maps was developed without us placing any boundary limitations on stakeholders. However, this did not result in totally 'unconstrained' individual maps because implicit stakeholder value and boundary judgments were inevitably involved (e.g., Alrøe, 2000; Midgley, 2000; Ulrich, 1983). Indeed, capturing these through the modeling was part of the point of the exercise. When the individual perspectives were merged using Cytoscape, the resulting map can essentially be viewed as a further, or second-stage, unfolding of the problem. This is because it represents the sweeping-in of all the involved stakeholder perspectives. The freshly merged map carried with it every element, relationship and weight provided by each individual stakeholder (no matter their agency, rank or

relationship with other stakeholders). This provided a first cross-stakeholder representation of the problem, without marginalizing any of the stakeholders.

As would be expected, the merged systemic perspective map was full of discontinuities, conflicting weights, nomenclature issues and missing elements, although the realization that some elements were missing only came when the participants undertook some collective analysis of the map. The discontinuities and conflicting weights represented some of the difficulties the agencies had in communicating with one another. Nevertheless, the map was a valuable 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 (Midgley, 1997b; Midgley et al., 1998; Midgley & Pinzón, 2011; Ulrich, 1983, 1996, 2003). In many traditional forms of analysis, boundary judgments about complex problems are the province of only one or just a couple of stakeholders (or 'experts') who have, for historical reasons, been granted decision-making authority. Even when discussing issues and making boundary decisions in a multi-stakeholder group, inequities can arise when certain stakeholders exert disproportionate authority 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 (Córdoba & Midgley, 2003, 2006, 2008; Gregory et al., 2020; Midgley, 1992b, 1994, 2000; Midgley & Pinzón, 2011), but it also suggests ways to address it in facilitated dialogue (Boyd et al., 2004; Midgley, 2000; Midgley et al., 1998; 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.

To reconcile differences in the merged system map and make collaborative boundary judgments, the stakeholders were invited to a one-day boundary-critique workshop. Two types of notes were taken by the first author during this workshop: notes on what changes were made to the map elements, relationships and weights due to stakeholder dialogue; and notes on the dialogue itself and the interactions among stakeholders as they worked through the map together. The first set of notes was used to help translate the marked-up map into Cytoscape. The second set was used to better understand the dynamics and effectiveness of the group dialogue and boundary critique.

Five stakeholders representing five different agencies were available to participate. During this workshop, stakeholders were asked to discuss a large laminated printout of the systemic perspective map laid out on a table (Figure 3). 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. The participants also collaboratively added elements they believed were missing.
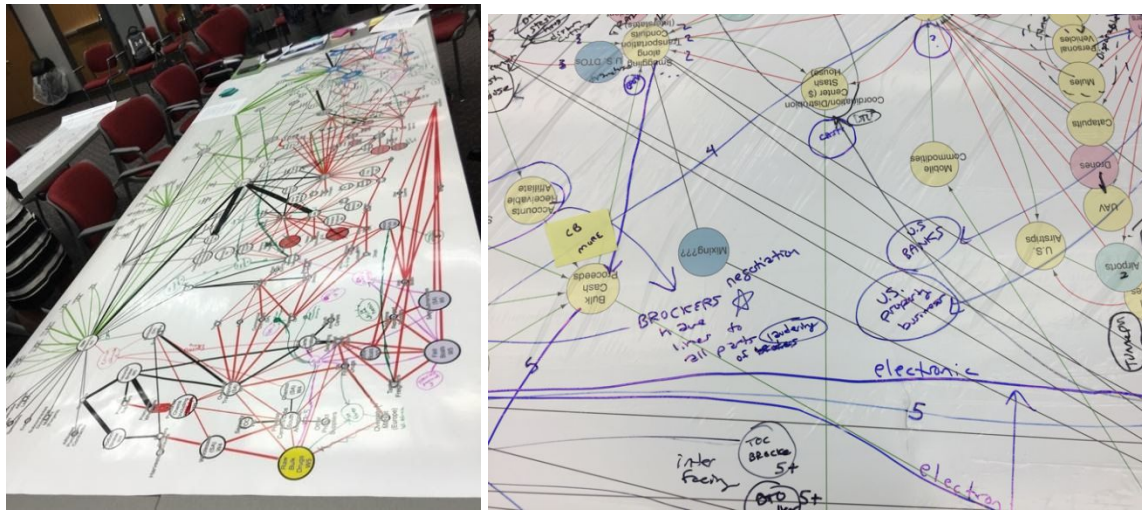
Figure 3: Photographs of the marked-up merged systemic perspective map after boundary critique

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 by individuals. All the stakeholders, who had individually mapped the problem and put weights on the aspects that they felt were most important, were able to clearly see that their perspectives differed from those of others. Although they may have considered themselves experts, it became clear that they brought in their own agendas when they described how they perceived the problem. One person's overriding priority, stemming from the purposes pursued through their role, could be perceived as having minor importance by a person with a different agenda. Here was where the boundary critique became an important part of how the stakeholders structured their understanding of the problem, with participants 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 consensus judgments 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. Although the local stakeholder initially began to acquiesce and agree to a weight of 1, encouragement from the facilitator and other stakeholders to give his reasons for why he had said that element was of high importance led to an engaged discussion about the differing perspectives. 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 actually the weighting emerged from careful deliberation. The local stakeholder agreed that, when seen from a broader perspective, his high-value element was not as crucial as it appeared from his more narrowly-bounded perspective. Similarly, the national/international stakeholder found the local perspective compelling and changed his position. This particular negotiation happened without much further intervention by the facilitator. It illustrates how systemic perspective mapping can bring conflicting perspectives to the attention of participants and (with facilitation if necessary) support them in reaching agreements.

In a minority of cases, the 'dialogue' was more one-sided. This appeared to be either because some stakeholders were much more vocal than others, 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. As has been noted in previous research (e.g., Dye & Conaway, 1999), 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 a systemic appreciation of these relationships is when dealing with a 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 the cartels had evolved as very flat organizations, clear hierarchical relationships were not evident. Cartels have a vested interest in ensuring that drugs, money and criminal acts cannot easily be traced back to leaders, and the full extent of cartel operations are kept deliberately opaque to their members (let alone outsiders) to limit the damage that can be caused when individuals are caught and co-operate with the Police. Because of this, the more obscure and indirect relationships were difficult to define and weight. Not only were there a lot of good discussions about how to assign weights to the interdependencies, but stakeholders found they had differing opinions on their nature. For example, one stakeholder identified the relationship between cartels and local gangs 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 agreements on most of them.

As the final exercise in the boundary critique workshop discussing weightings, 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 could be seen as artificially framing 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 policy response, budget and resource issues may stimulate conflicts, and the boundary critique process can be used to work through them collaboratively. Indeed, resource constraints can drive innovation (Gibbert & Välikangas, 2004; Välikangas & Gibbert, 2005) as long as conflicts are approached constructively. Putting budget pressures on countering the problem resulted in good dialogue about priorities and possibilities, and helped the participants consolidate their emerging team identity.

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 perspective maps were solicited from 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 involvement of the new agencies.

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). Through much reflection and dialogue, five options for intervention were ultimately agreed upon:

> (1) An enhanced shared intelligence environment;
>
> (2) A concentration on finding and removing intermediaries (nodes and links that connect higher level transnational organized crime leaders to more tactical gang activities);
>
> (3) Increased security clearance for local officers so national and international agencies could more easily share intelligence;
>
> (4) More effort to be put into addressing the money laundering part of the wicked problem, where stakeholders felt they could most 'hurt' the overall drug trafficking enterprise; and
>
> (5) Tapping into social media communications within gangs (an emerging important strategy at the local level that regional, national and international stakeholders were not previously aware could be of value to them).

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.

In the evaluation of this workshop, all the stakeholders rated the process as being 'very useful' (the highest grade) on their questionnaires. 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 systemic perspective, and they gained a new appreciation of how their actions could affect others. Overwhelmingly, they believed 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 have been pursued until the values and perceptions of all the stakeholders were reflected in the common map. However, this was not possible within the time constraints of our research.

4. **SUMMARY AND CONCLUSIONS**

The desired outcome of our research was to establish the potential value of a synthesis of systems methods and methodological ideas to address a specific wicked problem by facilitating a common understanding of that problem and then designing an interagency organization with the capacity to respond in a coordinated manner. Systemic intervention (Midgley, 2000) was chosen as the overarching approach, and within this, boundary critique, systemic perspective mapping and the viable system model were deployed. This is a methodological design to address governance challenges that we believe could have value in the context of other wicked problems, and indeed the first author has used it again to support interagency planning in the context of improving access to science, technology, engineering and mathematics (STEM) education for black and minority ethnic (BAME) school students (yet to be written up for refereed publication). We are setting out to research the proposition that this particular combination of methods could be a relatively stable and transferable one: i.e., it may not just be a bespoke design that has value in the context of the international illicit drug trade and its interface with local gangs in the city of Chicago, but could have wider utility in relation to a diversity of wicked problems and interagency contexts.

This paper has discussed how we used boundary critique and systemic perspective mapping to generate a common interagency understanding, which is the first part of a larger multi-method intervention to design new goverance approaches. Forging a cross-agency understanding of the wicked problem is vital to any successful design of an interagency response. In the process, respecting and appreciating the various and sometimes conflicting stakeholder perspectives and values is crucial – if formulating an understanding of the wicked problem is done without reference to multiple perspectives, that understanding is likely to be impoverished (Churchman, 1979a). 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 understandings of the wicked problem of organized drug crime from their single-agency perspectives. Each agency stakeholder had an early opportunity to provide their perspectives without pressure from other stakeholders, reducing the potential for them to be marginalized later on. 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 observations made during the intervention and the formal feedback provided by the participants indicates that systemic perspective mapping, combined with boundary critique, was highly effective in developing a subtle and well-justified common understanding of the drug trafficking problem. The stakeholders expressed their appreciation that illicit drug trafficking is a wicked problem that exhibits many interdependencies: e.g., "it was the first time that I had a visual depiction of the interconnectivity of each element". Also, they said that the approach enhanced mutual understanding amongst the agency representatives: e.g., "my operational focus is small, this allowed for greater understanding not only of the problem, but stakeholders perceptions and focuses" and "the different perspectives were critical in properly framing the problem". They also realized that the problem of drug trafficking will never be totally solved, but needs an interagency that can act like "a counter-system towards the wicked problem".

Because the participants were concerned about confidentiality and therefore did not want us to audio-record or videotape the sessions, we instead captured observations about stakeholders' behaviours in field notes and used this information along with formal questionnaires filled in by participants to assess the intervention. Clearly, this restricted the types of post-intervention data analysis that were possible. See White, Burger and Yearworth (2016) for a good example

of the use of videotaping to gather data to support theory-building about problem structuring interventions, bringing together Franco's (2013) idea of models as boundary objects with activity theory (e.g., Engeström, 2005, 2008) to explain the behaviours of stakeholders captured on video. Even audio-recording facilitates the detailed analysis of transcripts – for example, it allowed Velez-Castiblanco, Brocklesby and Midgley (2016) to provide rich evidence from an OR team's conversations to support their theory of how OR practitioners negotiate boundaries when designing their interventions.

Despite the limitations of our data, it was nevertheless clear that the stakeholder feedback on the exercise as a whole was overwhelming positive, with everybody saying that it was 'very useful' (the top grade out of the five options available). All felt that genuinely trusting relationships had been built, and there was 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.

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. The ability to formulate an interagency perspective under time constraints addresses the sense of urgency described by Levin et al (2012) as one of the defining features of 'super-wicked' problems.

The systemic intervention approach described in this paper was developed specifically to include multiple systems methods that address many concerns about achieving interagency success head-on. As we have discussed, interagency responses to wicked problems occur in highly political and budget-constrained environments. We feel strongly that a multi-method process is crucial. The systemic perspective mapping with individual agency representatives was necessary to develop an unfolding of the wicked problem before a merger into a single map could be attempted. However, because merging perspectives generates conflicts and discontinuities, boundary critique within the multi-stakeholder setting was crucial, and it ensured that the marginalization of stakeholders was minimized in the process of addressing the conflicts. The feedback from participants illustrates the ability of the systemic perspective mapping and boundary critique to do three things that mattered to those participants:

1. Be inclusive of all necessary agency perspectives, as long as the agencies are willing to participate,
2. Directly tackle conflicting agency viewpoints, and
3. Reduce imbalances in power and influence through active facilitation, and by giving individuals time to formulate their separate perspectives before bringing them together.

Although this research was not intended to produce an 'official' formulation of the wicked problem, it was conducted with real stakeholders from key agencies and resulted in a useful systemic perspective map of the illicit drug trafficking problem. The observations made during the intervention, and the feedback provided by the participants throughout the study, suggest that the systemic perspective mapping increased their knowledge of the interconnectedness of the problem. It also provided opportunities for a great deal of collaborative learning, particularly during the boundary critique workshops. In addition, the dialogue generated around the weightings of elements and interdependencies created a greater appreciation of the factors (missions, budgets, scales of operation, policies, etc.) that drive the differences in perspectives between the agencies. This resulted in improved levels of mutual respect among the stakeholders. Indeed, several of them

requested copies of the final map for further use within their own organizations, stating that a clearer systemic understanding of the problem, integrating multiple perspectives, can be useful even to inform a single agency's mission.

Having presented these positive findings about the value of systemic perspective mapping and boundary critique in developing a common interagency understanding of a wicked problem, and having argued that this can help address the urgency often felt by decision makers who want to improve their systemic awareness in the face of super-wicked problems, we nevertheless need to end this paper by acknowledging that we have not yet addressed another defining feature of these problems: having weak or non-existent institutions at the appropriate scale to enable co-ordination and take effective action (Ison, Alexandra & Wallis, 2018; Levin et al., 2012). It is for this reason that, after the common interagency understanding had been developed in our systemic intervention, we went on to use the viable system model (VSM) (Beer, 1984) to address this issue. How the common systemic perspective map was used alongside the VSM in the organizational design aspects of this research is discussed in a companion article to the current one (Sydelko et al., 2021).

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