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Introduction

The activity of specifying path to solution or resolution from a particularly messy or “wicked” problem situation is primarily defined in terms of constraints. In like manner, the field of public policy – its tools, as well as its history – has been defined according to the constraints of those who seek to understand, and perhaps influence, how policy is made. But some of the most consequential policymaking arises from a complex and messy process; made messier in the presence of multiple, competing stakeholders. Such scenarios are made all the more complex by the sometimes inconsistent, vague, and shifting motivations that are held by those stakeholders.

This manuscript discusses the constraints and opportunities involved in structuring policy problems from particularly messy problem situations. Background about the policy process is first introduced, to provide the necessary context. Next, the concept of complex adaptive systems is introduced in light of its potential for dealing with a particular set of such complex problem situations. A case that involves the application of adaptive governance, a concept derived from complex adaptive systems, is then briefly presented as a means of demonstrating the concept in an existing policy context. The manuscript concludes with the expected constraints and limitations for applying adaptive governance networks and suggestions for further study of the concept.

1. Structuring Policy Problems

1.1 Problem Structuring in the Policy Process

It is certainly possible for problem definition to be a relatively straightforward task. Many problem situations are well- to moderately well-structured; meaning that there are relatively few stakeholders, alternatives, and other relevant considerations. Examples of such situations include internal decisions within government agencies, such as budget setting, purchasing, hiring practices; and other situations where the stakeholders are either few, or in relative agreement.

When stakeholders are few and the alternatives are relatively clear, there is little need to apply methods for problem structuring. Whereas moderately- or well-structured problems can frequently be structured through building consensus or bargaining among stakeholder groups¹, the considerable complexity inherent to ill-structured and “wicked” problems makes it necessary for the policy analyst to take an active role in defining the source or sources of the problem.²

The various methods of problem structuring are therefore generally considered to be a critical aspect of the agenda setting stage of the policy process. Problem solving is not possible without first identifying the correct problem. The implication behind the need for problem structuring in public policy is that a failure at the problem structuring level could result in a Type III error: solving the wrong problem. If the interventions selected for policy implementation do not correspond well with the actual problem, then the policy stands a substantial chance of either failing, or further exacerbating the original problem situation.³

Some of the more egregious Type III errors tend to take place at the national level in more stable states, where problem structuring is based more strongly on fairly well established political idioms. At the national level, it is not uncommon to see a very limited set of alternatives under consideration, due in large part to the reduced set of interests that come about as a result of established interest-based or ideologically-rooted coalitions. Fewer interests translate into fewer stakeholder groups whose motivations need to be taken into account. This, in turn, results in a reduced set of solutions to be considered; severely limiting the number of viable problem representations that will be considered.⁴

Policymaking at the local levels, where there is relatively greater opportunity for more groups to make themselves heard, presents a greater likelihood of being affected by multiple stakeholder groups, and with them, multiple conceptualizations of the problem. As mentioned above, the stakeholder consideration is practical for delineating the set of solutions that may be considered. But the problem structuring process must necessarily take more into account than competing ideologies and viewpoints. Constraints often typify local politics, and that factor in particular can have a profound effect on how problems are structured at the local level.

The constraints experienced within local policy systems can sometimes turn an otherwise tractable problem into one that is better characterized as ill-structured, or in extreme cases, wicked. Constraints at any level may include lack of resources, poor information or problematic information flow, large exogenous

factors that cannot be decisively addressed at the local level, continuously evolving and competing definitions of the problem, or others.

When national problems devolve or manifest at the local level, the result can be large, messy, confused, and dynamic as the problems mature and develop within the local system. Such problems are, by definition, “wicked.” Local policymakers typically have little to no hope of resolving problems that exist primarily at the national or international levels. While it is often tempting to take the “no solution, no problem”⁵ point of view, some problems will manifest in such a manner as to demand attention and action.

Tools exist for structuring wicked policy problems at the local level – even those problems that may manifest from higher levels. But, to understand those tools, it is first necessary to understand the metaproblem from which they originate. The following section continues the discussion of problem structuring in public policy and introduces the concept of “wicked problems.”

1.2 The Structure of Wicked Problems in Policy Systems

A problem’s structure is key to understanding how amenable it may be to a solution. The more that a problem’s various variables and their interrelations are discernable and definable, the more “structured” the problem is thought to be. Generally speaking, poorly structured problems generally present more constraints for those charged with their solution. That is, constraints increase as the various aspects of a problem situation becomes less amenable to conceptualization. The converse is also true. Constraints themselves make problem definition increasingly difficult.

Interestingly, the year 1973 introduced three seminal treatments on problem structuring, constraints, and the inherent tractability of various problem scenarios, each taking a unique but valuable position on the issue of problem structuring. A spectrum can be derived from this confluence of problem structure definitions. The treatments on the subject range from incremental decomposition of problem situations, to a standard typology for problem structure, to a conceptualization of problems that defy all attempts at structure but also cannot be ignored. Here, each is discussed in turn.

Herbert Simon’s definition of well-structured and ill-structured problems was a well noted attempt to benchmark and typify problems according to their inherent tractability. According to this definition, for a problem to be well-structured, problem parameters, potential outcomes, rules governing interactions, rules governing processes involved, and explicit criteria for evaluation must all be known or at least knowable.⁶

But, as Simon points out, even relatively simple seeming problems appear to match the definition of being “well-structured” only when they are approached salami style: slice by slice. When taken as a whole, complexity quickly increases as reactions, interactions, and mitigating variables come into play. Additionally, approaching a problem myopically tended to substitute intermediate solutions for the ultimately desired end-state.

The inherent complexity present in even the simplest seeming problem situations led Simon to conclude that well-structured problems, as he had defined

them, do not exist. Rather, it is up to problem solvers to give sufficient structure to ill-structured problems in order to make them well-structured and, thereby, solvable – mainly through extending the existing knowledge base in and of the problem domain. In this manner, Simon’s definition depended largely on knowledge constraints to differentiate between well- and ill-structured problems.⁷

It is important to note that Simon was working from an elementary machine learning perspective. In that domain, continual learning and definition of the problem space was expected to yield a solution as the problem’s structure becomes better defined. This seems a sound recommendation for developing machine learning tools to structure unstructured information. The practical application of this approach in other fields, however, may be more limited. For fields such as public policy, the idea of classifying everything as ill-structured until it has been sufficiently mapped and defined is not terribly helpful as a classification strategy, especially in light of constraints on the practitioner’s time and other resources that are common to areas such as policy.

The taxonomies that were developed contemporaneously with Simon’s work give greater consideration to practitioners’ constraints. They are also arguably more useful for the purpose of conveying some perspective into the general tractability of a given problem. One of the more accepted and well used methods of classifying the relative structure of policy problems presents a rudimentary scale to express the nature of a problem one may face in the policy domain.⁸

Table 1: Taxonomy of Policy Problems⁹

<i>Variables</i>	<i>Level of Structure to the Problem</i>		
	<i>Well-Structured</i>	<i>Moderately-Structured</i>	<i>Ill-Structured</i>
Decisionmakers	One	Few	Many
Alternatives	Fixed	Limited	Unlimited
Utilities/Values	Consensus	Bargaining	Conflict
Outcomes	Certain	Uncertain	Risky
Probabilities	Deterministic	Estimable	Reckonable

The taxonomy, presented in *Table 1*, functions as a multidimensional guideline for categorizing a problem according to its essential tractability. The scale ranges from relatively simple problems, such as budget setting or hiring decisions, to scenarios that involve considerably more complexity, uncertainty, and risk. As with Simon’s definition of problem structuring, the demarcation between one state and another remains somewhat fuzzy. Even so, the variables that differentiate each level highlight the reasons for the decrease in tractability as problems become less well-structured.

Constraints on unanimity of vision and, relatedly, the ability to easily identify options for solving the problem increase as the number of decisionmakers increases. Alternatives multiply as individuals with multiple competing perspectives

seek out a path to solution that will be to their benefit. These dynamics serve to constrain a decisionmaker's ability to select from a discrete set of alternatives.

In like fashion, knowledge in and of the system becomes increasingly constrained as the number of alternatives and decisionmakers increase. Multiple perspectives, motivation, and alternatives create a situation that greatly reduces the chances of a successful solution or resolution to a problem, resulting in increasing risk of failure – real or perceived.

It is that risk – or likelihood – of failure that defines what has become known as the “*wicked problem*” end of the spectrum. Much like Simon’s dichotomy of ill-structured problems that become well-structured through the process of incremental definition, wicked problems occupy the other extreme of the policy taxonomy. Wicked problems are noted to be “inherently different” in their nature from the sort of problems that Simon was considering. These are the sort of problems with which policies that are designed to confront them are bound to fail.¹⁰

In essence, wicked problems can never become well-structured because they defy definition and are, therefore, largely intractable. The concept of wicked problems was initially developed by Horst Rittel, who was taken by the differences between the sort of problems faced by those working in the “hard sciences,” such as physics or biology, and those problems faced by those working in the area of social policy (later to become the policy sciences).¹¹

Rittel, with the aid and encouragement of his colleague Melvin Webber, introduced ten properties that distinguished problems as being “wicked.”

1. There is no definitive formulation of a wicked problem
2. Wicked problems have no stopping rule
3. Solutions to wicked problems are not true-or-false, but [better or worse]
4. There is no immediate and no ultimate test of a solution to a wicked problem
5. Every solution to a wicked problem is a "one-shot operation"; because there is no opportunity to learn by trial and error, every attempt counts significantly
6. Wicked problems do not have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan
7. Every wicked problem is essentially unique
8. Every wicked problem can be considered to be a symptom of another problem
9. The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem's resolution
10. The social planner has no right to be wrong¹²

Each item on the list presents an important, but not entirely discrete, aspect of what makes wicked problems wicked. Taken together, some themes emerge that aid in our understanding of them.

The general complexity and recursiveness of wicked problems ensures that they are perpetually ill-structured. Given that they cannot be defined, there is therefore *no definitive formulation of a wicked problem*. A complete list of solutions is not possible without a tractable definition of the problem. The further implication is that, without a formulation of the problem, it is frequently difficult or *impossible to have an exhaustive set of potential solutions or a well-described set of operations that may be incorporated into the plan*. Additionally, without clear delineation of endpoints to the various causal chains within a wicked problem, it is not possible to define an end state. Wicked problems, therefore, *have no stopping rule*.

In addition to the sub-problem of detangling the network of interacting variables, policymakers must also take into account multiple, competing and interacting stakeholders. The multiplicity of stakeholder groups results in multiple perspectives and shifting alliances, with each group drawing upon a unique perspective to explain the nature of the problem. Each perspective has the potential to suggest a unique mechanism for addressing the problem and perspectives may shift over time as alliances and interactions change. Given multiple perspectives, then, *the choice of explanation will ultimately determine the mechanism used for the problem's resolution*. Additionally, under such conditions, *solutions to wicked problems are, at best, judged as better or worse according to the perspective of each group*. There is no "correct" or "incorrect" solution.

Another result of the complexity involved in addressing ill-structured problems in the public sector is the unpredictability of how the system will react to solutions. Without a delineation of cause and effect, any inputs can potentially reverberate over multiple pathways for indeterminate periods of time. Such varied and – by definition – unpredictable responses to attempts at a solution suggest that *there is no clear means for testing solution to a wicked problem in the near term or long term*.

The reverberations have further consequences for attempting solutions. Once a solution is attempted, it cannot be undone. Its effects will continue to resonate and change the state of the system. For that reason, *each solution to a wicked problem is a "one-shot operation."* Along that same line of reasoning, regardless any superficial similarities that any two wicked problems may bear, the unique mix of interests and variables in each location ensures that *every wicked problem is essentially unique*. History matters in every location, and local attempts to mitigate or solve a problem tend to become an enduring aspect of that locale's history.

Clearly, the complexity and scope of wicked problems is such that they are functionally metaproblems, or problem sets. As such, *every wicked problem can be considered to be a symptom of another problem*. This is a notable example of where incremental approaches, such as the one suggested by Simon, break down in the face of wicked problem situations. As mentioned above, attempting to solve a wicked problem by increments may have complex and lasting consequences. The tendency toward path dependence constitutes one of the more salient differences between messy social problems and scientific so similar work: policy work typically has a direct effect on people's lives. Each attempt at addressing a wicked problem changes the system, often in unpredictable ways. Those changes can have profound

effects. The *policy maker or social planner, therefore, has no right to be wrong*. Those working in the social and policy areas have little or no room for experimentation in a wicked problem. Rather, they are liable for the consequences of the actions they generate.

Clearly, the criteria for defining wicked problems are, at first blush, somewhat messy. They are also primarily descriptive and do not easily translate to prescription. As demonstrated above, however, the ten criteria do enjoy some thematic cohesiveness and overlap. As it happens, these commonalities map well to the concept of complex adaptive systems, a concept that is gaining attention for its promise in aiding the development of new strategies to understand, model, and mitigate wicked problems.

2. Harnessing Complexity to Mitigate Wicked Problems

2.1 Complex Adaptive Systems (CAS) for Understanding Wicked Problems

When the concept of complex adaptive systems (CAS) was first developed, it was approached as somewhat of a fuzzy concept, with little agreement as to the terminology and even some of the conceptual elements.¹³ In recent years, the concept has come into more frequent use and its conceptual elements have correspondingly begun to converge. Generally, CAS are composed of large numbers of dynamic, interacting entities or actors that may themselves be systems. Depending on the field to which the concept is being applied, actors may be individuals in a society, individuals or organizations in a policy arena, cells in and around a tumor, species in an ecosystem, etc. Such systems of systems give rise to emergent patterns of behavior that co-evolve – frequently in unexpected ways – along with their environment.¹⁴

After roughly two decades of existence, there remains no standard for terminology in CAS, likely due to its use in multiple fields to describe a wide variety of environments. There is, however, growing agreement around many of the main properties that help to define how such systems function and how they may be modeled.¹⁵

Systems that are considered to be complex and adaptive become so through the networked **connectivity** between actors, actors and their environment, and between various other levels within the system. Actors in the system possess their own set of rules that guide their behavior. The connections between actors may be formed, dissolved, and reformed. Over time, connections coalesce into subnetworks which may themselves interact with one another and the environment. These interactions provide natural, though nonlinear, **feedback loops** that function as the system's memory. Such memory provides a learning mechanism that allows the system to adapt and evolve.¹⁶

The changes and adaptations that arise from within a complex system are considered to be emergent and self-organizing. The concept of **emergence** reflects the manner in which unexpected macro-scale regularities result from the complex interactions of actors within the system. Such patterns of behavior come into being as actors self-organize according to their preferred state and in response to the preferences of others as well as the environment within which they reside.¹⁷

Emergent behaviors are, by their nature, unregulated and the sum of the interactions is thought to be greater than that of individual parts, making them characteristically different in scale and nature. In other words, complex adaptive systems are characterized by **exponential, nonlinear impacts from changes** arising from within the system or from the environment around it. This is known more colloquially as the “butterfly effect,” referring to how even small changes to a system can have profound consequences down the line.¹⁸ Further, the network of connections and feedback loops creates a system where inputs and changes are persistent as their effects continue to reverberate as they pass through the system. Further, such systems are open, with boundaries that resist definition. This suggests that actors respond to one another as well as the environment. As such, the system **co-evolves** along with the environment, with each responding to changes in the other.¹⁹

In sum, in the fashion of wicked problems, CAS are dynamic and exist in a state of **constant change and evolution**, involving elements of both order and stochastic processes. When considered together (*Figure 1*), the main properties of CAS provide interesting insight into the mechanisms behind the complexity and intractability of wicked problems. Conceptually, CAS appear to provide a reasonable operationalization of the scenarios that give rise to wicked problems.

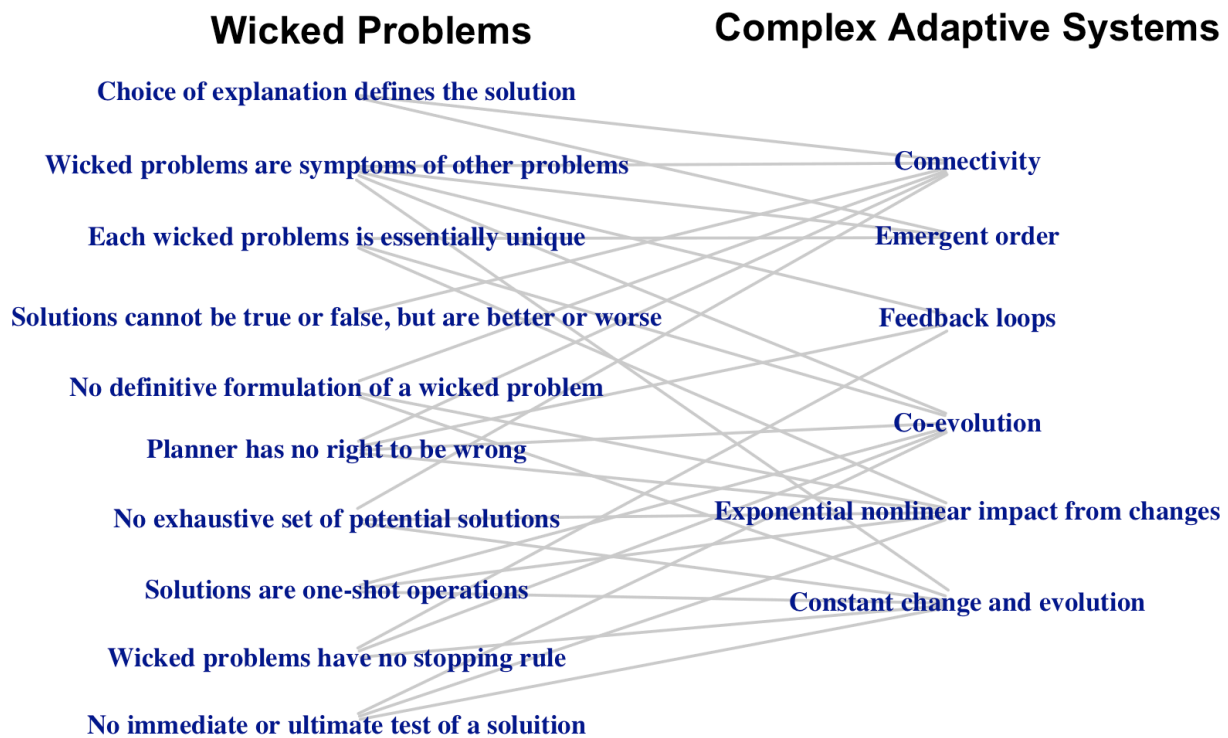


Figure 1: Conceptual correspondence between elements of wicked problems and properties of complex adaptive systems. Lines indicate interrelated concepts.

The relationships depicted in *figure 1* emphasize a striking overlap between the two concepts. For example, the CAS property “*connectivity*” refers to networked interdependence of independent actors. This property figures heavily into multiple aspects of wicked problems. For example, wicked problems are commonly interpreted as being symptoms of other problems. The multiple and shifting perspectives that arise from networked interactions (e.g., connectivity) resolve into groups with often markedly different perceptions of the source of a wicked problem. The multiple perspectives of competing stakeholders tend to interpret the problem situation according to factors that are important to them.

The perception of the symptoms of a wicked problem are not, however, constant. Rather, they constantly change and evolve. Such evolution is heavily influenced by changes in the policy environment and the feedback of what has already been tried and what has succeeded or failed in the past.

The shifts in priorities over time are just one aspect of the constant changes and evolution that the system will undergo while solutions are being sought. Additionally, the nonlinear nature of causal chains and the unpredictable nature of the magnitude of the outcome provide further foils the possibility of an acceptable solution to the possibility of identifying a definitive formulation of the problem.

It is possible to travel much deeper down the rabbit hole of exploring the many interconnections between wicked problems and CAS. But the main takeaway should be that the two are heavily intertwined, with some properties of CAS (i.e., connectivity, co-evolution, exponential nonlinear impacts, and constant change) being particularly enmeshed within the wicked problems conceptual elements. The value of the relationship is that CAS, as a description of how the system operates, provides systemic mechanisms for prescription in dealing with wicked problems, which are mainly defined according to the policymaker’s limitations.

The idea that CAS maps well to wicked problems is by no means new. There have been a variety of applications of CAS for understanding wicked problems in the public sphere over the past two decades. The next section provides a brief overview of some of this variety and discusses the value of approaching wicked problems from the CAS perspective.

2.2. Structuring Wicked Problems from a CAS Perspective

The perspective offered by complex adaptive systems (CAS) offers insight into the processes behind what makes wicked problems so wicked. The prescriptions offered by the CAS perspective are, by measures, both compelling and aspirational. While some approaches bear a strong resemblance to the more linear approaches to problem structuring and planning, others would require fundamental changes in the standards or culture governing how organizations presently interact in policy systems.

One of the more frustrating aspects of wicked problems for policymakers and planners is the inherent nonlinearity that confounds attempts at establishing pathways to a solution or solutions. Therefore, one of the main the benefits of CAS for analysts resides its computational roots. From an early time point, CAS

incorporated agent-based simulations to model and thereby understand the processes that characterize such systems. From an analytic and planning standpoint, this is the main advantage that CAS can offer for addressing wicked problems. Sufficient knowledge in the system holds the potential for the exploration of potential pathways to a solution for a given wicked problem.²⁰

Rather than attempt to solve the problem, agent-based models are thought to mitigate the issue of not having an exhaustive set of potential solutions to a wicked problem. Simulations could essentially enhance problem structuring through allowing for non-linear models that bear a much closer resemblance to wicked problems. Though they have not yet developed to the point that they have come into common use, analytics using simulation offer the potential greatly increase the validity of the representations being used to generate predictive outcomes of policy interventions.

Although simulations were essentially behind the genesis of CAS, it is not the simulations themselves, but the discoveries they offer that have received the most attention. The properties of complex adaptive systems that were discovered and refined through the process of modeling and simulation have provided a lens that many have found useful for understanding the nature of actions and interactions between agents in a complex system.

It is the area of organizational collaboration and cooperation²¹ that has seen the greatest amount and variety and application of complex and adaptive properties for addressing wicked problems. Rather than using conventional approaches to structuring and solving problems, this tactic advocates changing the very structure of organizational interactions on the policy side in order to mirror some aspects of complex adaptive systems. It is thought that allowing for adaptation within the governance structure will provide greater traction in combat wicked problems by creating institutional networks that may co-evolve along with the problem environment. Although there are optimistic advocates for radical system overhaul to transition the entire governing system in to a self-organizing system of entities that will co-evolve with its environment²², most focus on smaller scale innovations. The mechanisms that set these designs apart from earlier cooperative strategies is their focus on networked adaptation and polycentric leadership.

The organizational approach to dealing with wicked problems focuses on the potential for *adaptation* in the face of complexity or chaos. The approach may be referred to, depending apparently on scale, as adaptive leadership²³ or adaptive governance²⁴. The approach has been applied to intergovernmental collaborations²⁵ as well as collaborative teams comprised of a much wider set of actors²⁶. In each case, this approach prescribes a diverse and egalitarian form of governance that is characterized by shared mission and the devolution of authority to lower levels.

The object of the adaptive governance approach is to deal with the connectivity-related aspects of wicked problems by creating a governance network with constituent units that combine and collaborate as necessary in response to changes in the social or policy environment. The constituent units may all be from the public sector, a mix of public and private, or all private. What matters is their shared goals, sustained interaction, and diverse sources of knowledge and information. The networked interactions and dialogue also offer the added

advantage of fostering resource sharing and increased access to information within the system.

2.3 Adaptive Governance in a Local Policy System

The constraints placed upon local policy systems can sometimes turn an otherwise tractable problem into one that is better characterized as ill-structured, or in extreme cases, wicked. Such constraints may include lack of resources, poor information or problematic information flow, large exogenous factors that cannot be decisively addressed at the local level, continuously evolving and competing definitions of the problem, or others.

Difficult conditions of local policy making also bring with them opportunities that lend themselves to a more dynamic approach to problem structuring and, ideally, problem solving. In particular, local policy arenas have the advantage of relatively finite numbers of stakeholder groups, and therefore, a relatively more tractable problem of goal communication and sharing. The smaller sets and reduced diversity of actors in local policy environments creates the possibility of building a shared conceptualization of the goals that would be desirable for the policy system. Under such conditions, it is possible to build a network of entities that are capable of relatively rapid and dynamic policy responses to what may otherwise be an intractable and rapidly arising problem.

Under such circumstances, local policy networks may elect to take on an adaptive governance structure – even if they do not recognize it as such. The key elements are (1) a motivated and diverse set of action-oriented *stakeholders*, (2) a set of commonly held *goals*, and (3) a consistent means of *networked interaction*. The stakeholders constitute a network of actors that share a goal or agenda set under conditions that prevent any one of the actors from dominating proceedings to the point that they may coopt the shared mission.

Adaptive governance bears some superficial similarities to an advocacy coalition framework (ACF), in that it involves a shared problem area, fundamentally shared values, and a set of stakeholders. ACF involves a subsystem of ideologically aligned groups that are intent on advocating a particular outcome.²⁷ But the resemblance does not extend much farther.

The important distinction between ACF and adaptive governance is that advocacy coalitions sponsor policy to be implemented by others. Adaptive governance networks, on the other hand, are comprised of actors that are also active on the implementation side of policy making.

Adaptive governance networks are not necessarily comprised of actors – meaning individuals, organizations, or agencies – that are well aligned in their ideology – but only their end goals, broadly defined. An additional important discrepancy between ACF and adaptive governance is that problems that are defined and addressed within an adaptive governance network are not necessarily expected to stay solved, given that these networks are more likely established in response to otherwise intractable, or wicked problems.

Adaptive governance networks function as a means for otherwise overburdened actors to create an open exchange of information and facilitate

potential resource sharing and collaboration. The end result should be a dynamic network of stakeholders that share a broadly defined set of goals; individual missions that coincide with achieving those goals, or goals that are closely aligned; and, perhaps ironically, constraints substantial enough to prevent any one of the participants from achieving those goals on their own. The section below provides an example of a naturally occurring adaptive governance network, and its ability to dynamically provide an effective response to an otherwise intractable problem.

3. Example Case

3.1 Background: The Community Alliance for Safety and Peace (CASP)

With a population just over 155,000, and an estimated 71 gangs and over 5,000 gang members in and around the city; Salinas, California is particularly afflicted by gang violence. But as a primarily agricultural city, Salinas lacks a sufficient tax base to fund a large enough police force to effectively address the violence and other crimes that a city of that size would normally experience. Similarly, NGOs and other organizations in the Salinas area that are concerned with the problems of gang and youth violence of have found it challenging to raise sufficient funding to carry out their individual missions of mitigating violence, turning youth away from gangs, and strengthening families in the area.

The Community Alliance for Safety and Peace (CASP) is a network of organizations and individuals in Salinas, California. The network was assembled in its present form in 2009 for the purpose of addressing the shared general objectives of reducing violence in the community and “building a better future for the children of the area.”²⁸ Participating organizations identify as belonging to governmental, NGO, faith-based, for-profit, education sectors. Membership has since risen from an initial ±30 to the current roster of more than sixty regularly participating individuals and organizations.

Given the constraints present due to the lack of resources available to the police force and the community, coupled with the poor suitability of traditional law enforcement measures to reducing gang participation; the idea behind CASP was to share the burden of violence reduction among a wider set of actors. Although the city of Salinas has funded an office to help maintain and coordinate among the CASP organizations, CASP enjoys its own governing structures and relative autonomy, with governmental organizations such as the Mayor’s office, police department, health department, and others participating as equals in the network. Albeit, the Community Safety Division (CSD) in Salinas City Hall does play a coordinating role in order to sustain the effort and maintain a space for meetings and interaction.

It is important to note that CASP itself does not have a direct or mandated role in city governance, or law enforcement. Rather, the CASP network functions as a facilitator for the flow of information and resources. Bi-monthly CASP meetings function as a forum, where the various organizations interact, share news about themselves and their initiatives, and forge collaborations on grants and other projects. From this largely undirected environment arises an adaptive system of related initiatives where the support is distributed and knowledge and resources are shared more widely through the city, and surrounding area, than would

otherwise be possible. In effect, CASP meetings and the culture within CASP promote the opportunity for otherwise cash-strapped and information-poor entities to pool resources in a dynamic manner.

CASP, therefore, fits the description general of an *adaptive governance network* given (1) the variety of motivated stakeholders participating in CASP; (2) the shared objectives of reducing violence in and around Salinas, and reducing violence levels in the community; and (3) the networked forum and collaborative events that allow for trust-building as the facilitation of resource and information exchange to help mitigate resource and informational constraints experienced by its members. A recent evaluation revealed that resources and information tend to be shared in an egalitarian manner throughout the network (*Figure 2*).

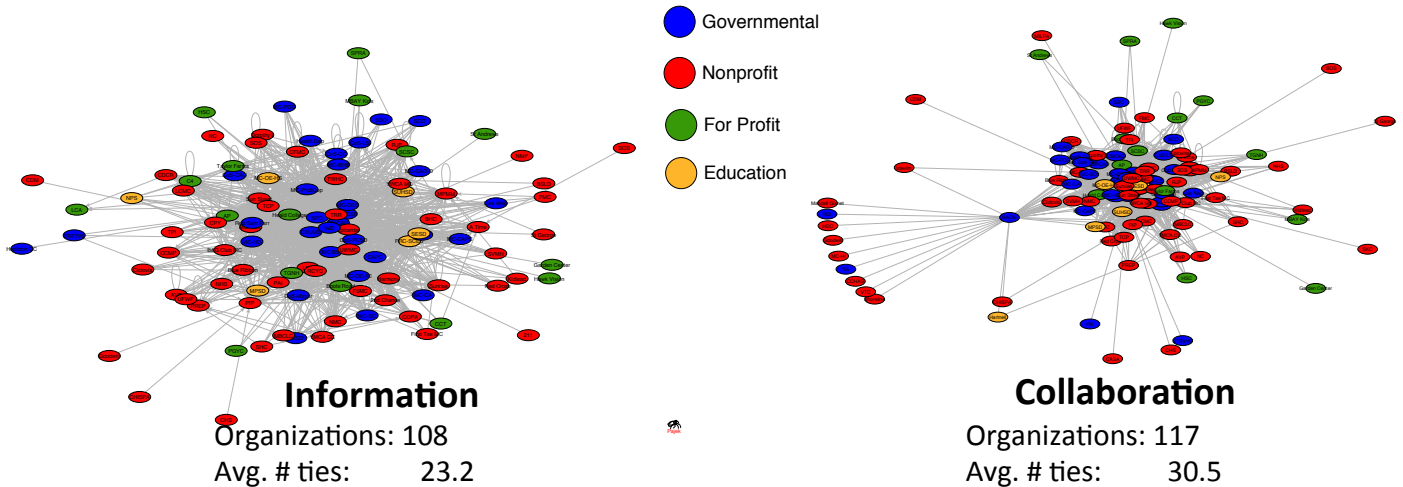


Figure 2: Two aspects of CASP – information sharing and collaboration on projects. Note that organizations (colored ovals) that share similar sets or relationships appear closer together. Also, organizations on the periphery with only one or two ties were generally non-respondents on the CASP network survey.

The network visualizations in *Figure 2* depict two types of relationship that manifest within CASP: information sharing; and project or grant collaboration. As such, they represent the flow of information and resources throughout the network. The lack of any obvious clusters of cliques in either network may be taken as a relatively flat, non-hierarchical distribution of resources and information that is relatively free of bottlenecks and similar impedances. Similarly, the absence of any strong tendency for organizations within the same sectors – as indicated by node colors – to form ties within sectors may be taken as an indicator of intersectoral collaboration and communication. Similarly, brokerage *between* sectors was measured as more than twice the exchange *within* sectors in each network, and over

75% of the organizations in the each network are within two steps of one another. Each of these measures may be taken as an indication that the CASP network functions well as a facilitator of information and resource flow between sectors.

3.2 An Exogenous Shock is Introduced to the Network

In May of 2014, an officer-involved shooting was recorded by bystanders and widely distributed through social media. The shooting was the third such incident in less than two months taking place in a city that averages one police-involved shooting per year. The timing of the incident corresponded with several similar events in other cities, and the beginning of the national phenomenon of the “Black Lives Matter” movement. Although the shootings, which totaled four by the end of 2014, were later ruled to be justifiable, the spectacle of the recording appears to have enraged a substantial segment of Salinas’ Hispanic population.²⁹

Protests became increasingly violent and it began to become apparent that an already overstretched police department would not be able to keep the peace if the unrest continued to increase. Two community meetings were held to allow residents to express their opinions on the shootings, but the presence of government officials proved counterproductive, as some attendees appeared to escalate their anger in response. When it became apparent that some among the community were planning a march, the concern was that the already tense situation would continue to escalate into something much larger.

Due in part to the lack of funding during this period, the Salinas Police Department was also experiencing a decrease in the number of uniformed police officers. With uncompetitive salaries in Salinas, officers were finding better paying jobs in smaller towns that also experienced less violent crime. The resulting personnel shortages contributed negatively to an already difficult work environment for police, as overtime and the necessity of taking multiple shifts became more common. With police officers already overextended due to longer hours, triple shifts, and almost nonexistent time off; there was reason for concern that the police department would not be a sufficiently effective force for deescalating any anti-police demonstrations.

The combination of a disgruntled rank-and-file police force and strong anti-police sentiment provided reason to believe that the situation could very easily spiral out of control. An alternate peacekeeping strategy was needed – preferably one that did not directly involve police.

Ultimately, the matter was addressed an *ad hoc* manner between parties interested in preventing violence from worsening in the already tense city. A representative from the Community Safety Division (CSD) in City Hall met with representatives of two grassroots nongovernmental organizations that had strong ties with Salinas’ Hispanic community where the march was originating. The three parties had already developed mutual respect and trust through their long association with CASP. Regardless of any other sentiments they held in the matter, no one in the meeting wanted to see an escalation in violence.

According to the plan that they developed, the police would not attend the upcoming march and the community NGOs would instead act as organizers to help

prevent the march from disintegrating into larger protests or violence. The organizers drafted rules for participation in the march and changed the name from “March Against Police Brutality” to the more positively phrased “March for Respect, Dignity, and Justice.” The rhetoric used by march participants was similarly toned down with announcements that signs would be provided to those participating and that anti-police signs would not be allowed. The sign ordinance and code of conduct were both enforced by what was reported as a large number of volunteers – referred to as “march captains” – wearing conspicuous yellow vests.

The resulting march was free of additional violent incidents. Although the march did not resolve the underlying problem of anger among some residents of Salinas, its handling did appear to confound what was beginning to appear as an escalation in violent outbursts. Additionally, it was carried out by organizations other than the police department. Although a contingent of police did stand by at a distance of a few blocks from the march, their presence was not required.

3.3 So, What Happened?

Given that the “Black Lives Matter” movement was in full swing as the lethal force incident took place, it is reasonable to conclude that, at the very least, a national problem exacerbated an already intractable local problem in this case. At worst, the protests constituted a local manifestation of a national problem. In either case, the problem of the brewing anger toward police in Salinas was a problem that policy makers there could not solve with the tools they had available.

The announcement of the upcoming march was broadcast in local news media in Salinas, so it is reasonable to believe that many, if not most, of CASP’s membership knew that the event was taking place. What occurred next was not a mobilization of the CASP organization. In fact, very few members of CASP took part in the intervention on the march, and most were entirely uninvolved. This was not an official CASP function. But CASP was the source of the innovation, given its role in engendering ties between otherwise unconnected sectors in the area.

Ultimately, the problem was addressed on an *ad hoc* basis between specific organizations. The groups that did eventually elect to participate in the intervention each had ties with those involved with the upcoming march. The Community Safety Division has close ties to the Salinas Police Department and was able to plan – with the permission of the Chief of Police – on their behalf. Somewhat similarly, the NGOs who took part had close ties with the community members who were intent on organizing the march.

In this way, each of the self-selecting stakeholder organizations from within the CASP network was tied in some manner to the upcoming event. Each brought a different sort of expertise to the group: the NGOs brought knowledge in and of the community and connections that allowed them to intercede and mitigate some of the problem. The CSD representative was able to work with the local government to help plan for a way to remove police from the immediate area of the march, while maintaining the potential to step in if necessary.

The plan was flexible, non-traditional, and adaptive to the environment as it existed at the time. It did not require the mobilization of the entire network and it would likely have failed if it had due to mixed feelings toward police on the part of at least some members within CASP. But full participation was neither necessary, nor was it ever considered a goal.

CASP operates under the shared mission of reducing and preventing youth violence in Salinas. Although the intervention was geared toward preventing violence during the march, that goal is not explicitly linked to the CASP mission. The organizations involved were, therefore, best describes as working to prevent violence that could harm the community as well as constituent organizations within CASP. Additionally, the *ad hoc* group was empowered to fill the role that the police were compelled to temporarily relinquish. The decision was made dynamically and organically from among the connections within the CASP network.

The policy event of addressing the march in an innovative manner is important for its use of nontraditional personnel and methods to address one aspect of an intractable problem. Had the police participated as escorts for the march, there was a strong chance that their presence would have sparked an escalation in violence. Had it not been for the trust-based relationship between local government and local NGOs, it is possible that the outcome could have been very different. Certainly, there were some among Salinas' residents who expressed their strong displeasure at being denied the chance for a more vigorous demonstration.³⁰

Ultimately, the wicked problem of the poor relationship between the police and the community in Salinas was not solved. One manifestation of the problem was, however, successfully addressed through adaptive governance and the problem was dampened and the problem was at least muted through those efforts.

4. Conclusions

This manuscript has explored the concept of wicked problems in public policy and how complex adaptive systems help to clarify some of the aspects that drive those problems. Relatively speaking, both areas are still new and much of the mystery behind each remains unresolved. The links between them are compelling. But, a good deal of work remains before agent-based models are able to successfully mimic an actual wicked problem. In the parlance of CAS, if you haven't grown it, you haven't shown it.

That is not to say that the models presented in this manuscript have no value. Rather, there is doubtless much work to be done before agent-based computational modeling is well used in a policy analysis context. The lessons that such modeling has thus far revealed, on the other hand, has provided insight that has motivated a number of government and nongovernmental agencies to reconsider the nature of organizational collaborations, especially in the face of wicked problems.

But, as with any method, the application of CAS theory does not provide a panacea for all things wicked, or even just a few. What the reader should take away from this manuscript is that even messy and apparently intractable problem situations are following some sort of rules and are operating according to a paradigm. By shifting the response to make it conform at least somewhat better

with the paradigm being addressed, policy professionals stand a better chance of at least mitigating such problems.

At first blush, the various aspects that define wicked problems appear to be insurmountable. The act of applying a lens, such as complex adaptive systems, helps to reduce the mystery and sense of hopelessness that wicked problems are wont to convey. Models like those provided by CAS provide new insights into *how* a system like wicked problem functions. Insights such as adaptive governance allow a solution to better match a problem.

It is not unreasonable to suspect that adaptive governance networks can be replicated at the local level in other areas that share similar characteristics. Given (1) a diverse and motivated stakeholders; (2) a set of shared objectives; and (3) some form of networked organizational collaboration; it is possible to engender similar ties within another set of stakeholders. The broad objectives, mix of stakeholders, and constraints present can differ according to the situation.

The shared constraints are an especially important element to the model. Adaptive governance systems may not function well in the presence of strong resource inequality. If one or more of the participating organizations of agency is resource rich – in relative terms – then it should be expected that the proposals of resource-poor member organizations would more frequently rely upon methods that are predicated upon leveraging the resources of the comparatively well-resourced group.

Other potential problems, such as objective creep, the desire to return to older models, and decreasing heterogeneity among participants, represent further potential challenges to this particular model. Much more work is needed to evaluate similar networks for their own results.

Endnotes

¹ For examples of problem structuring methods associated with moderately-structured problems, see: John Mingers and Jonathan Rosenhead (2004) "Problem structuring methods in action." Invited review. *European Journal of Operational Research*. 152, p. 530- 554.

² V.A. Brown, P.M. Deane, J.A. Harris, and J.Y. Russell (2010). "Towards a just and sustainable future." In V.A. Brown, J.A. Harris, & J.Y. Russell (Eds.), *Tackling wicked Problems – through the Transdisciplinary Imagination*. London: Earthscan.

³ Dunn, William. (2001) "Using the Method of Context Validation to Mitigate Type III Errors in Environmental Policy Analysis," *Knowledge*.

⁴ Christopher J. Bosso (1994) "The contextual biases of problem definition," chapter in David A. Rochefort and Roger W. Cobb, eds. *The Politics of Problem Definition: Shaping the Policy Agenda*. University Press of Kansas: Lawrence, KS.

⁵ "...creativity consists of finding a problem about which something can and ought to be done. In a word, the solution is part of defining the problem. Mike Teitz tells about a soldier in New Zealand who was ordered to build a bridge across a river without enough men or material. He stared along the bank looking glum when a Maori woman came along asking, 'Why so sad, soldier?' He explained that he had been given a problem for which there was no solution. Immediately she brightened, saying, 'Cheer up! No solution, no problem.'"

Aaron Wildavsky (2007, 1979) *Speaking Truth to Power: The Art and Craft of Policy Analysis*. New Brunswick: Transaction Publishers, p. 3.

⁶ Herbert A. Simon (1973) "The structure of ill structured problems," *Artificial Intelligence*, 4, pp. 181-201.

⁷ Ibid.

⁸ Ian I. Mitroff and Francisco Sagasti (1973) "Epistemology as general systems theory: An approach to the design of complex decision-making experiments," *Philosophy of Social Sciences*, 3, pp. 117-134; as expressed in William N. Dunn (1994, 2004, 2008) *Public Policy Analysis: An Introduction*. Pearson: Upper Saddle River, NJ.

⁹ Table slightly modified version of the one appearing in William N. Dunn (1994, 2004, 2008) *Public Policy Analysis: An Introduction*. Pearson: Upper Saddle River, NJ, p. 79.

¹⁰ Horst W. J. Rittel and Melvin M. Webber (1973) "Dilemmas in a general theory of planning," *Policy Sciences*, 4, pp. 155-169.

¹¹ As legend has it, according to the memory of Andrejs Skaburskis, Rittel presented an early version of his ten differences between policy problems and scientific problems at a seminar held by West Churchman. At the close of his presentation, Churchman remarked that those certainly sounded like "wicked problems." Shortly thereafter, Churchman gave full credit to Rittel for the term "wicked problems" as well as the accompanying definition. For more information see: Andrejs Skaburskis (2008) "The origin of 'wicked problems'", commentary, *Planning Theory & Practice*, 9:22, pp. 277-280; and C. West Churchman (1967) "Wicked problems," guest editorial, *Management Science*, 14:4, pp 141-142.

¹² Rittel and Webber, 1973

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- ²³ Kania, John, and Mark Kramer (2011) "Collective Impact," *Stanford Social Innovation Review* 9:1, pp. 36–41.
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