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Forty years of wicked problems literature: forging closer links to policy studies

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ABSTRACT

Rittel and Webber boldly challenged the conventional assumption that ‘scientific’ approaches to social policy and planning provide the most reliable guidance for practitioners and researchers who are addressing complex, and contested, social problems. This provocative claim, that scientific-technical approaches would not ‘work’ for complex social issues, has engaged policy analysts, academic researchers and planning practitioners since the 1970s. Grappling with the implications of complexity and uncertainty in policy debates, the first generation of ‘wicked problem’ scholars generally agreed that wicked issues require correspondingly complex and iterative approaches. This tended to quarantine complex ‘wicked’ problems as a special category that required special collaborative processes. Most often they recommended the inclusion of multiple stakeholders in exploring the relevant issues, interests, value differences and policy responses. More than four decades later, however, there are strong arguments for developing a second-generation approach which would ‘mainstream’ the analysis of wicked problems in public policy. While continuing to recognize the centrality of complexity and uncertainty, and the need for creative thinking, a broader approach would make better use of recent public policy literatures on such topics as problem framing, policy design, policy capacity and the contexts of policy implementation.

KEYWORDS

Wicked problems; problem framing; policy capacity; complex problem-solving; collaboration; information uncertainty

Introduction

In recent decades, there has been strong support for adopting scientific approaches to policymaking, program evaluation and performance-based public management. Scientific approaches have been seen as providing not only deep understandings of complex social problems but also the ‘evidence-based’ tools for designing sound policy responses (Nutley, Walter, & Davies, 2007). The proponents of the ‘evidence-based’ policy movement have tended to see political ideology and lobbying as the main obstacles to science-informed policymaking to improve complex areas of social policy. But what if scientific approaches themselves are inadequate or incomplete, for different reasons – for example, by tending to produce narrow understandings of the social problem and therefore encouraging unsound policy responses?

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Rittel and Webber's critique of social science orthodoxy in social policy and urban planning (Rittel & Webber, 1973) made a strong contribution to ongoing debates about knowledge and power in the policy and planning professions. Their critique established significant grounds for doubting the efficacy of primarily science-based or technical approaches to public policy and planning. These limitations applied both to *understanding* the dynamic fields in which complex social problems evolve and also to the process of *devising* appropriate policy responses. However, Rittel and Webber did not develop a clear and coherent account of how to improve policy analysis and social planning practices.

My argument in this article is that, after more than four decades of policy analysis and experience, we now have stronger understandings of how policy problems evolve, how debates are shaped around issues and solutions, and how to identify a range of methods (e.g. analytical tools, managerial capacities, consultative processes) that might help develop more effective policy responses. These relevant areas of policy knowledge include the literatures on problem framing, policy design and policy capacity. These insights are increasingly being applied in complex policy areas characterized by conflicts and uncertainties, emerging crises and political complexity.

The following sections outline the background to the wicked problems debate about science and policy knowledge, the recent widening of these debates and some areas where new agendas for policy research are being fruitfully developed.

Background: the emergence of 'wicked problems'

Several critical perspectives have challenged the salience of positivist certainties in social policy and questioned the alluring vision of 'evidence-based' policymaking. Historically, some of these criticisms focused on the power-shaping realities of political and organizational systems. For example, the political-economy critique is that, despite extensive evidence of poverty, public decision-making in practice reflects the interests of power elites, regardless of formal democratic processes such as legislative elections. In this view, the issues chosen for policy attention and the way those issues are defined will generally reflect the structural power of business, their lobbyists and their political representatives (e.g. Domhoff, 2013; Lukes, 2005). Other critics of positivist social science emphasize the cognitive and sociocultural differences that hinder agreement in a society characterized by divergent values. This cognitive and sociocultural argument is that policy-relevant knowledge about social issues is always plural, not unitary – and therefore, consideration of social issues is ultimately about how divergent perspectives are expressed, mobilized and sometimes reconciled (Fischer & Gottweis, 2012; Hajer & Wagenaar, 2003; Schön & Rein, 1994).

The 'wicked problems' literature is mainly located in this second camp, focusing on how actors in various situations articulate their diverse perspectives about public issues. In the modern world, with fast and extensive communication systems, the fragmentation and politicization of public issues has become normalized. Rittel and Webber (1973) claimed that contested and complex social problems could not be 'tamed' or domesticated through standard managerial approaches that rely on rational-analytic models of planning and decision-making (see also Churchman, 1967; Head & Alford, 2015; Skaburskis, 2008). In drawing attention to the intractable and contentious aspects

of wicked problems, Rittel and Webber argued that public policy responses are often partial or even counterproductive, that ideological partisan solutions are one-sided and unstable and that even the best available policy responses are highly provisional rather than enduring. These difficulties for policy analysis and action were seen as embedded in wide arenas of social and environmental policy and planning. By drawing attention to the inherently political and conflictual dimensions of how enduring problems are defined and scoped, Rittel and Webber drew attention to the limits of scientific expertise in shaping appropriate policy responses to contested social issues.

Their 1973 article was primarily directed at critiquing and problematizing the rational planning approaches of their era, rather than offering detailed advice on improved processes for managing complex and wicked issues into the future. Nevertheless, they suggested that inclusive discussion, involving a wide range of stakeholders, would be needed to deal with the most challenging and divisive issues: 'an argumentative process in the course of which an image of the problem and of the solution emerges gradually among the participants, as a product of incessant judgment, subjected to critical argument' (Rittel & Webber, 1973, p. 162). Inclusive methods were seen as necessary to address highly contested arenas of policy and planning, because the multiple views about problems and solutions are anchored in differing value perspectives.

By their nature, values cannot be adjudicated and settled by positivist science and 'more data'; rather, value differences need to be managed through broad processes of argumentation and conflict resolution among stakeholders. Many other writers of this period reinforced the view that modern policy problems are often values-based (e.g. Rein, 1976). Moreover, these problems are often systemic and interlinked, and therefore require integrated analysis and broad-based discussion among stakeholders.

Every problem interacts with other problems and is therefore part of a system of inter-related problems, a system of problems ... a mess ... The solution to a mess can seldom be obtained by independently solving each of the problems of which it is composed ... Efforts to deal separately with such aspects of urban life as transportation, health, crime, and education seem to aggravate the total situation. (Ackoff, 1974, p. 21)

Those problems regarded as more 'straightforward' are more amenable to being managed through ongoing programs and standards; if an issue is widely understood with reasonable levels of clarity, it is more likely to be resolved and adjusted through a negotiated agreement. To the extent that a policy issue becomes settled and institutionalized, its 'problematic' status is overcome, at least for the time being. By contrast, other problems are seen as more enduring and intractable, and thus more likely to defy resolution. Examples at a national and local level might include poverty and inequality, family violence, drug control, criminal behaviour and environmental pollution. At an international level, enduring complex problems might include sustainable development, climate change policy response, terrorism, international business regulation and illicit migration (Organisation for Economic Cooperation and Development [OECD], 2011, 2015). These and related issues, such as those underlying the Sustainable Development Goals of the United Nations [UN] (2015), have become central to the policy agendas of international networks. These complex and systemic problems typically provoke divergent views about the very nature of the issues, their relative importance and appropriate responses. Disagreements arise because key stakeholders' viewpoints are anchored in

different assumptions, values, interests and capacities. These differences of perspective have major consequences, since the way in which a problem is defined or scoped is closely linked to preferred remedial actions to address the identified problem.

Developing and extending the ‘wicked’ policy legacy

The literature on ‘wicked problems’ since 1973 has grown exponentially, but often in ways that disconnect discussion from the insights available in the fields of policy studies and public management, not to mention the broader social sciences. For example, there has been a tendency to emphasize the binary distinction between ‘tame’ and wicked problems, and to perceive social policy issues as inherently wicked, owing to widespread evidence of stakeholder disagreements. A preferable approach would be, first, to see ‘wicked’ features as part of a complex continuum or typology of problem types (Alford & Head, 2017; Newman & Head, 2017b), and second, to tackle empirically these substantial challenges for analysis and practice in terms of applying concepts from the emerging literatures on policy design, policy capacity, policy deliberation and political legitimacy. In other words, some of the concepts and frameworks necessary to extend and deepen the ‘wicked problems’ literature are already available in related literatures.

Owing to the enduring and complex nature of ‘wicked’ issues, the challenge for decision makers is to demonstrate that the issues are being well managed rather than fixed or ‘solved’. As Conklin notes, because there are no clear and definitive solutions, ‘You don’t so much “solve” a wicked problem as you help stakeholders negotiate shared understanding and shared meaning about the problem and its possible solutions. The objective of the work is coherent action, not final solution’ (Conklin, 2006, p. 5). This accords with Rittel and Webber’s argument that there is no scientific ‘best solution’ to a wicked problem, but only provisional responses that are negotiated among relevant stakeholders. Recent scholars have endorsed the view that claims about ‘solving’ or ‘fixing’ a wicked problem should in most cases be replaced by the language of tackling, managing, coping and addressing wicked problems (Head & Xiang, 2016). Moreover, wicked problems cannot be properly ‘tamed’ or ‘fixed’ by dissolving them into multiple elements which are then reassembled in a manner suited to a series of small projects. The political attempt to convert messy unstructured problems into ‘well-structured’ micro problems begs the question of whether it is possible to resolve messy issues by converting them into ‘technically controllable’ issues (Hoppe, 2010, p. 88).

The wicked problems paradigm serves as a reminder that the *political arenas* of policy argument constitute the battlefields for complex social policy arguments (McConnell, 2017). Various groups of political leaders and stakeholders propose policy interventions with different degrees of optimism or scepticism about the possibilities of successful policy reforms to solve major problems. Hoppe (2010) argues that responding to policy problems requires the analysis of several interrelated dimensions, spanning power, knowledge, values and processes. Wildavsky recognized the difficulty of tackling broad and persistent social problems: ‘problems are not so much solved as alleviated, superseded, transformed, and otherwise dropped from view’ (Wildavsky, 1979, p. 386). Later writers have argued that ‘coping’ strategies are sometimes the best available mechanisms (Wallace, 2008), and that incremental adjustments may sometimes be more effective than ambitious blueprints (Daviter, 2017).

Depending on the situations faced by government, the politics of *responding* to policy problems and to urgent crises will generate diverse tactics among political leaders – ranging from avoidance and denial, symbolic reassurance, blame attribution, establishing expert inquiries, through to strategic engagement forums with key stakeholders. Sometimes the entrenched differences in knowledge and values can be reconciled or accommodated, but sometimes the differences are simply suppressed by government through exercising power and overriding dissenting views. The claim by some politicians that tough problems (e.g. illegal immigration) can readily be ‘solved’ by bold actions (e.g. enhanced border protection), is often part of a rhetorical tactic indulged by leaders seeking electoral support. Indeed, there are instances where political leaders are not really interested in resolving the problem, but prefer cynically to intensify group conflict, inflame emotional identities and ‘stir the pot’ if this tactic serves their political interests.

The way in which problems are recognized, prioritized and managed is of central concern in policy systems. The dynamics of policy debates and processes, across different policy fields and contexts, have been much analysed since Rittel and Webber challenged the efficacy of scientific social planning. Arguably, it is time to strengthen and mainstream the analysis of ‘wicked’ problems by drawing on more nuanced models of policymaking and implementation. While continuing to recognize the centrality of complexity and uncertainty, and the need for creative thinking about emerging challenges, there are advantages for analysts and practitioners alike to draw upon wider literatures that assist in understanding and responding to problems arising in complex sociopolitical and socioecological processes. The policy studies literature (e.g., Araral, Fritzen, Howlett, Ramesh & Wu, 2013) is providing important frameworks and insights concerning the theory and practice of policy design, policy deliberation, policy reform, effective implementation, policy evaluation, policy legitimization and the determinants of policy success and failure. In addition, there has been a growing recognition of the need to investigate case studies in a more rigorous way, including the role of comparative case analysis in refining our understanding of policy actors in variable contexts.

These policy studies themes are all highly relevant for better understanding and managing wicked problems. In actuality, public policy practices comprise a turbulent stream in which the parameters change rapidly. As Wildavsky remarked, ‘Past solutions create future problems faster than present troubles can be left behind’ (Wildavsky, 1979, p. 70). And as Selman noted in relation to environment policymaking,

In practice, despite enormous amounts of dedication and inspiration, environmental planning only ever achieves partial success. This is due to the ‘wickedness’ of environmental issues, deriving not only from their technical complexity, but also from the multiple arenas where they are contested and debated. As capacities are built to overcome one barrier, another one arises; as progress is made towards sustainability, so the finishing line recedes. (Selman, 1999, pp. 168–169)

In the following sections, attention is given to situating and strengthening the analysis of wicked problems by drawing upon relevant public policy literatures on problem framing, policy design, policy capacity, and several applied contexts of policy implementation.

Problem framing

In contemporary democratic political systems, policy agendas are rhetorically focused on the ‘problems’ that leaders and stakeholders believe are worthy of attention and debate. Defining and managing the high-priority problems is central to policy debate and public administration. Policy research has increasingly focused on how these policy problems are contested and shaped. Problematizing the assumptions of key policy actors, or ‘unpacking’ the way problems are understood, has become a central theme within the policy studies literature (Bacchi, 2009; Dery, 1984; Head, 2017; Peters, 2005). The importance of problem definition and agenda-setting processes within policy debates is well established. Much of the literature focuses on the ‘front end’ of the policy process where the nature and scope of problems are most visibly formulated and debated, and this process of policy debate and reconsideration is iteratively repeated (Dery, 1984). These debates about the nature and significance of a problem actually recur through all phases of the policy process, from problem scoping through to implementation and evaluation.

Some problems (‘tame’ in Rittel and Webber’s terminology) are relatively well-defined and well-structured, with agreed technical parameters and a relatively solid knowledge base. Some other problems are seen as less structured or ‘ill-structured’. Several authors have sought to move their analytical focus beyond the logical basis of problem structuring, in order to focus on the intrinsic qualities of entangled and ambiguous problems, whose boundaries and connections are described as ‘messy’ and ‘turbulent’ (Ackoff, 1974; Ansell, Trondal & Ogard, 2017; Dunn, 1988; Horn & Weber, 2007; Ney, 2009). These messy problems include the complex and contested issues that display many of the features typical of ‘wicked’ intractable problems.

The nature and significance of the policy problem is shaped through debates on ‘framing’. This is crucial for how the debates about problems, contexts and responses are represented. Schön and Rein (1994) consider framing ‘a way of selecting, organising, interpreting and making sense of a complex reality to provide guideposts for knowing, analysing, persuading and acting’ (Schön & Rein, 1994, p. 146). The dynamics of problem framing and problem definition are important for many reasons, because the way a problem is defined is very closely tied to the type of solution that is proposed (Bacchi, 2009; Peters, 2005). For example, consider the ways of framing a wicked problem like poverty. If poverty is largely seen as an individual-centred problem, generated by deficits in personal skill and motivation, the solutions proposed will be oriented toward encouraging individuals to develop their skills and work orientation. By contrast, if poverty is largely seen as an enduring structural feature of society, generated by economic systems and market forces, the solutions proposed are likely to be oriented toward social security systems, employment programs and income safety nets (Alvarez, Barney, & Newman, 2015; Rose & Baumgartner, 2013; Schneider & Ingram, 1993; Sutherland et al., 2013).

The framing of policy problems also varies according to institutional location and local political dynamics. These factors provide the context for scoping, designing and implementing robust policies. For example, in the Netherlands, an empirical study of climate policy and action in four small to medium cities found that ‘localist, multilevel and issue network membership factors’ influenced local climate policy action. The study also emphasized the impact of ‘local capacity building schemes issued by provincial

government, inter-municipal network collaboration, and the potential for local governments to mobilize and organize citizen action' (Hoppe, van der Vegt & Stegmaier, 2016).

Policy design studies

The concept of policy design has often been used to emphasize the creativity, innovation and learning dimensions of the search for policy alternatives, in contrast to the mechanistic metaphors of design derived from computational approaches to data analysis and planning. Policy design practices are clearly vital for engagement with wicked problems. For Linder and Peters (1984), a design perspective would need to build systematically on three dimensions of policy knowledge: understanding causation, the evaluation of alternatives, and understanding how interventions operate. It would be necessary to deepen policy thinking around (1) the characteristics of the relevant problems (scale, collectiveness, certainty, predictability, independence); (2) the nature of stated goals (value-laden, operational, process of goal-setting); and (3) the nature and suitability of various instruments (Linder & Peters, 1984). More recently, Howlett has argued that policy design represents an 'integrated' approach that comprises the identification and scoping of the problem, deliberation on the choice of instruments and procedures and the evaluation of implementation including longer-term outcomes (Howlett, 2011, 2014). The analysis of complex issues requires special care, however, because such problems are often politically contentious and marked by 'framing contests' that oversimplify the problems and recast them in more emotional and value-laden terms. This has become typical within the recent 'post-truth' policy debates, fuelled by the manipulation of social media channels (Jasanoff & Simmet, 2017).

In designing their responses to complex policy problems, there has been a tendency by governments to fragment the issues into more manageable elements or projects (Barber, 2008). While this is understandable from the perspective of allocating roles and responsibilities, there is a danger that the broader context is lost. As Ruhl and Salzman note, 'Agencies that treat all massive problems as if they were simple aggregation phenomena will have only limited success, potentially causing more problems than they solve. Instead, it is helpful to recognize how different problem properties can lead to different policy pitfalls' (Ruhl & Salzman, 2010, p. 100).

One of the core challenges in policy design is to select policy instruments – or more typically a *mix* of instruments – that are appropriate to the policy task. The analytical challenge in instrument selection – namely, to understand the causal impacts and likely effects of various measures – is a theme closely related to the literature on evidence-informed policy (Haskins & Margolis, 2014; Head, 2016). The political and institutional dimensions of instrument choice are just as crucial. Policy design and implementation are not just about drafting legislation but are fundamentally about negotiation, persuasion and dealing with difficult trade-offs (Majone, 1989). In some instances of policy change, a relatively straightforward administrative approach to program design may be suitable – for example, where there are high levels of clarity and consensus about goals and methods. However the political challenges of implementation will unfold very differently where goals are ambiguous and where methods are controversial (Matland, 1995). This is the territory of wicked problems.

Depending on the complexity of issues, a mix of research knowledge, practitioner knowledge and citizen experience may be required to understand the dynamics of client behaviour and program effects. Experience in policy co-design (Bason, 2014) has confirmed the need for better understanding of behavioural change, both at the individual level as well as the organizational and interagency levels. In some cases, goals cannot be achieved simply through legislation and regulation, and policy success will depend on behavioural change and voluntary compliance with new social norms (Weaver, 2014, 2015). Traditional tools and instruments by which governments seek to influence citizens' behaviour (e.g. legislation, regulation, taxes and subsidies, information) remain central, but new mixes of policy interventions are increasingly seen as necessary (Howlett, 2011, 2014). Among these innovative approaches, increased attention is being directed towards using improved communications tools to encourage behavioural change among individual consumers (such as water and energy efficiency practices) in order to achieve broader social purposes (such as natural resource conservation and the transition toward renewable energy). But wicked problems of sustainable development require action at several levels.

Policy capacity

The challenges of dealing with wicked problems place massive burdens on the capacities and resilience of state institutions to design and deliver successful interventions. In contemporary democratic systems, public policy discussions are not primarily about the knowledge base (policy-relevant evidence and experiential knowledge), but more about managing political risk, building competence, deploying resources wisely and maintaining the support base for leadership groups and institutions. In other words, modern democratic policymaking is centred on the perceived *legitimacy* of leaders and their decision-making processes, as well as concerns about the likely *effectiveness* of the chosen policy instruments. Perceptions of legitimacy are generally linked to the perceived qualities of the governance processes (fairness, inclusion, information and so on). Perceptions of policy effectiveness are linked not only to hard evidence about performance or achievement of outcomes, but also to stakeholders' ideological preferences and values (e.g. use of market incentives versus regulation). All of these matters are politically contested.

The capacity of a policy system to debate, design and implement carefully considered policy proposals is crucial not only for democratic legitimacy and the reputation of leaders, but also for achieving civic outcomes. Building policy capacity is thus important both for system legitimacy and for goal attainment. Policy capacity is generally taken to comprise not only analytical skills for assessing current performance and future policy options, but also capacities to undertake medium- and long-term planning and strategic goal-setting (Howlett, 2015). Policy capacity includes not only competence in policy design advice but also competences in the implementation, coordination and evaluation of ongoing programs (Head, 2015; Painter & Pierre, 2005; Tiernan, 2011).

There has been vigorous political debate concerning how policy systems 'manage' complex and cumulative policy agendas. Historically, the progressive-reformist parties have generally argued for increasing the capacities of public institutions, including their managerial and analytical skills to deal with complex multi-stakeholder issues.

Following the spread of neoliberal ideologies in the form of ‘new public management’ (NPM), many critics have lamented the apparent decline in capacities within public service agencies. This decline is attributed to, first, the privatization of public enterprises and the outsourcing of contracts to the business sector, and second, the increased politicization of policy advice through direct appointments of ministerial advisors (Bakvis, 2000; Painter & Pierre, 2005). To the extent that governments are continually criticized for incompetence in the face of crises, the reputational expertise of public agencies is further eroded. By contrast, the ‘small government’ lobbies have tended to avoid taking responsibility for tackling wicked problems or have defined them as matters for ‘the market’ to resolve. Such advocates of ‘small government’ consistently argue against ‘overloading’ public institutions with ambitious programs that are both expensive and unsuccessful (Friedman, 1980).

Thus, the political debate about building the policy capacity of the public sector is part of the fabric of debates about better managing wicked problems. There is continuing robust discussion about the key elements of capacity that are most vital under various conditions of rapid change and emergent crisis, as noted below.

Implementation contexts

The policy studies literature has demonstrated that there are important differences in the dynamics and configurations of specific policy fields, and corresponding variability in the sets of actors, networks, capabilities and institutional contexts. The challenges in scoping complex and contested issues, and in developing effective policy responses, are always situational (linked to time and place) and are connected to institutional differences and traditions across national boundaries. For example, the problem of effectively managing gun violence is very different in the USA by comparison with Canada, Australia and many other countries (Newman & Head, 2017a). These contextually nuanced challenges play out in different ways, depending on stakeholder and knowledge differences, capacity to manage crises, the complexities of particular policy issues and the contribution of collaborative leadership. These challenging contexts are outlined below.

Managing difference and uncertainty

The wicked problems perspective emphasizes the role of stakeholder perceptions, values and interests in explaining how issues are scoped, priorities are set and possible solutions considered. For Rittel and Webber (1973), pluralism is seen as an inherent feature of modern societies, and as a positive feature to be celebrated (Webber, 1978), rather than an inconvenience to be suppressed through technocracy and scientific decision-making. Public policy, from this viewpoint, is not so much about establishing truths but more about legitimating the feasibility and acceptability of next steps. Rather than a reliance on expert-driven science and data analysis (which might provide reliable and compelling solutions), the central focus is on communication and negotiation, in order to mediate the values and interests that are articulated by citizens, consumers, business lobbies, community and environmental groups.

Given the complexities arising from various forms of stakeholder conflict and knowledge uncertainty, a key theme is to identify policy processes for dealing with the messy, ambiguous, controversial and unstructured nature of wicked problems (Balint, Stewart, Desai & Walters, 2011; Hoppe, 2010). Some areas of policy and administration settle into routine patterns, where the dominant modes of governance involve incremental adjustment and performance monitoring. By contrast, the political attention of leaders and the mediatized theatre of public debate generally focus on the more controversial, uncertain and emergent policy problems – those which require ‘non-routine’ processes to help identify long-term policy responses that stakeholders will see as feasible and legitimate.

Uncertainties can arise from knowledge gaps or conflicts, from value differences and from organizational or regulatory complexities. These are all likely to exacerbate tensions inherent in addressing wicked problems, according to Koppenjan and Klijn (2004). To address these tensions and uncertainties, a new literature has emerged on the theory and practice of inclusive forms of deliberation for policy and planning, such as deep engagement and the use of stakeholder forums and citizens juries (Fischer, 1993; Fischer & Gottweis, 2012; Hajer & Wagenaar, 2003; Innes & Booher, 2010; Schön & Rein, 1994). If the intent of leaders and stakeholders is to reach broad agreement on a feasible and legitimate policy stance, while mitigating outbreaks of partisan posturing, some of these processes for airing grievances and reconciling differences will need to be conducted ‘behind closed doors’ (Campbell, 2003). In order to allow innovative options to emerge, policy actors may need to be protected from politicization (Hoppe, 2010, p. 140). Deliberative spaces or forums for reasoned debate and discussion may allow actors to be shielded temporarily from the fierce glare of everyday scrutiny and partisan politics. These collaborative processes are designed to facilitate the emergence of new thinking and greater consensus (Ansell & Torfing, 2014; Weber & Khademian, 2008).

Policy responses to crisis

Many wicked problems seem to lurch from crisis to crisis. The literature on policy response to crisis can make useful contributions to understanding some types of wicked problems. Crisis generally involves the perceived risk of major harm to populations, to organizations, to leadership reputation or to the environment. Wicked challenges might be embedded in some of those crises, especially those generated by human behaviour (rather than those caused entirely by natural disasters). Political, social and economic crises highlight the importance of good leadership and effective management in identifying risks, undertaking contingency planning and coordinating a range of organizations that can address the challenge (Drennan, McConnell & Stark, 2015; Keen, 2008; May, Sapotichne & Workman, 2009). Crisis management generally involves rapid response by leaders and managers, rather than lengthy consultations among stakeholders, but preventative action (such as the preparation of contingency plans) is regarded as important for mitigating the likely harmful effects. Crises can also act as circuit-breakers in providing opportunities for new thinking, where old practices are manifestly inadequate.

But some wicked problems develop slowly and incrementally, and fail to be recognized as requiring urgent attention, for example, global climate change or global

population growth. These can be seen as latent or creeping crises. Long-term preventative measures are very difficult to generate, owing to a combination of political factors (political risks for leaders and the framing of competing priorities as more urgent) and constraints on financial investment to mitigate future large risks. Moreover, leaders and policy advocates have to contend with the widespread ‘discounting’ of future risks and rewards against the current set of expectations and short-term benefits (Giddens, 2011; Kahneman, 2011).

Policy responses to other crisis-linked wicked problems, such as responding to a spike in refugees or a surge in terrorist incidents, require a high level of coordination between government agencies (Christensen, Lægreid & Rykkja, 2013, 2016). Better coordination is widely seen as a necessary element in responding effectively to many kinds of wicked problems, but the political and managerial challenges of effective coordination can be immense (Peters, 2015). The institutional capacities of a policy system are put under stress under these conditions.

Policy complexity challenges

Complex issues are likely to highlight gaps in knowledge, diverse interests, and a wide range of stakeholder perspectives, all of which create higher levels of uncertainty and ambiguity. This poses analytical, political and managerial challenges for understanding and responding to wicked problems. Managing complex public governance systems is clearly fraught with difficulties and uncertainties, and the ‘results-oriented’ economic solutions offered by NPM consultants are viewed with suspicion by complexity thinkers (Kiel, 1994; Teisman, van Buuren & Gerrits, 2009).

Most writers analysing complex problems urge the need for capacity-building at every level to facilitate skills development and rapid adaptation to emerging events or trends. They see great value in the adaptive nature of networks that can span across the sectors of stakeholders and organizations (Klijn & Koppenjan, 2015). Head and Alford (2015) argue that the ‘problem complexity’ and ‘stakeholder divergence’ aspects of wicked problems can be tackled through new approaches to systems thinking, collaboration and coordination, together with an adaptive-leadership approach by public leaders and managers. Termeer, Dewulf, Breeman and Stiller (2015) argue that four broad sets of governance capabilities are needed: (a) reflexivity, or the capability to deal with multiple frames; (b) resilience, or the capability to adjust actions to uncertain changes; (c) responsiveness, or the capability to respond to changing agendas and expectations and (d) revitalization, or the capability to unblock stagnations. Xiang (2013) argues that the collective or ‘social’ nature of working with wicked problems and adaptation strategies requires a ‘holistic and process-oriented approach’ that is ‘adaptive, participatory and transdisciplinary’. Working through an ‘open and heuristic process of collective learning, exploration and experimentation’, such an approach promises to be ‘efficacious in fostering collaborative behavior, reducing conflicts, building trust among all stakeholders and communities involved and ultimately producing better and more satisfying results’ (Xiang, 2013, p. 2). These indicative directions for public leaders and managers remain difficult to accomplish in a world characterized by short timelines and severe fiscal constraints.

Complexity theory, originally developed in the biophysical sciences, draws attention to the multiple interconnections, and surprising side effects, that undermine leaders' aspirations to 'control' their sociopolitical systems. Features of system complexity include feedback loops that allow opportunities for learning, interconnections between diverse issues and organizations, self-organizing opportunities in niche or local areas, decentralized or dispersed leadership nodes that can generate innovation and the variability of initial 'starting conditions' or institutional contexts (Holmes et al., 2017; Rutter, Savona & Glonti et al., 2017; Sanderson, 2009). The policy literature on complex systems has been growing rapidly, and many scholars have seen connections between the discussion of wicked problems and complex systems (Geyer & Cairney, 2015; Geyer & Rihani, 2010; Head & Xiang, 2016). Policymaking through public institutions is inherently challenging, and there are many tensions and paradoxes underlying policy governance (e.g. reconciling stability and change, effectiveness and legitimacy). But, as Pollitt (2009) remarks, further work is needed to demonstrate the potential value of complexity-based approaches through an intensive program of empirical research. Further work to demonstrate the value of the 'complexity' lens will need to avoid simply relabelling some well-known features of interdependent problems that operate across multiple scales.

Collaborative governance for wicked issues

Wicked issues indeed operate at multiple levels and have spillover effects across adjacent policy sectors (such as interconnections between the UN Sustainable Development Goals). In recognition of the major challenges posed by these issues of interdependency, a large research literature has emerged concerning collaborative governance and boundary spanning. Many writers have identified the positive benefits arising for leaders and organizations working across sectoral boundaries (O'Leary & Bingham, 2009; Weber & Khademian, 2008). In outlining useful approaches for the co-design of innovative solutions, Ansell and Torfing (2014) argue that collaboration can foster innovation through synergies, joint commitment and learning processes.

Joined-up interagency coordination within government is one part of the challenge (Bardach, 1998). The broader challenge is to establish effective arrangements across the vast divides between public sector agencies and the non-government spheres represented by business, community and research organizations (Torfing, Peters, Pierre & Sørensen, 2012). In terms of wicked problems, the concern is that the NPM emphasis on efficiency and simplicity that emerged strongly in the 1980 and 1990s tended to generate fragmentation within government, thus undermining the capacity to address complex wicked issues. It has therefore been necessary to establish new processes to bring these organizations and sectors together, both to discuss the nature of the problems and to consider the spectrum of possible policy responses (O'Flynn, Blackman & Halligan, 2014). These new processes include stakeholder forums and citizens juries, as noted above.

Sanderson (2009) argues that policy learning should be a paramount objective in designing innovative approaches to complex and intractable issues. Incremental and adaptive approaches, including pilot programs and rapid-cycle evaluations, could allow

new ideas to be tested while guarding against negative impacts emerging elsewhere in the system. Placing a high priority on policy learning and the continuous refinement of options also allows for adaptation to the evolving circumstances that are typical in complex systems. However, the widespread political culture of risk aversion may undermine honest acknowledgement of the fact that solutions are provisional and require continual adjustment. In other words, some of the innovations needed to deal with wicked problems require a more flexible mindset concerning risk and innovation (Australian Public Service Commission [APSC], 2007), not only on the part of public managers but also on the part of their ministers.

Conclusions

This article has proposed that to sharpen the explanatory capacity and generative power of wicked problem theorizing, it would be helpful for scholarly analysis to draw more deeply on cutting-edge developments in contemporary policy sciences. These developments include a strong focus on considering problems from several perspectives, designing instruments or programs that accommodate complexity and ambiguity, accounting for crises and surprises, improving policy and evaluation capabilities and strengthening the collaborative capacities of the policy system. In the current political climate of populist disdain for expertise (Nichols, 2017), and widespread lack of trust in the institutions of public governance, it is all the more important to use best available evidence and to communicate the value of open processes for tackling complex and wicked problems. Wicked problems may need to be approached on different levels of analysis and using a range of instruments; and there is no 'one best solution' (Verweij & Thompson, 2006).

In confronting the intractability of complex policy challenges, the 'wicked' problem perspective in public policy entails a call for governments to embrace stakeholder pluralism, acknowledge the limits of current knowledge, foster learning processes and develop procedural reforms to make policymaking more open and transparent (Ansell et al., 2017; Danken, Dribbisch & Lange, 2016; Hoppe, 2010). However, more work is needed to develop a more nuanced understanding of how to measure policy success and failure in relation to complex and wicked issues (Howlett, Ramesh & Wu, 2015). For example, an important issue is how to assist practitioners in their attempts to assess the efficacy of various alternative pathways for the better management of wicked problems (Downe, Martin & Bovaird, 2012; Shiell, Hawe & Gold, 2008).

The wicked problems framework resonates more positively with constructivist approaches to policy studies because of the emphasis given to the diversity and primacy of stakeholder values and practitioner perspectives. In cases where entrenched differences among stakeholders and decision makers are impeding progress, constructivists emphasize the role of dialogue and conflict resolution as methods to facilitate new pathways toward managing the policy challenges. The fundamental challenge for policy analysts is to focus carefully and reflexively on the nature of the policy problems, their evolution, the experience and knowledge of relevant stakeholders and the prospects of effective action in different situations.

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