

Studying Wicked Problems Forty Years On: Towards a Synthesis of a Fragmented Debate

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Schwerpunkt: Contested Public Organizations

Thomas Danken/Katrin Dribbisch/Anne Lange

Studying Wicked Problems Forty Years On: Towards a Synthesis of a Fragmented Debate

Abstract

Over the years, the concept of ‘wicked problems’ has inspired a diverse set of contributions. However, the lack of a clear underlying definition makes it difficult to advance scholarly knowledge on ‘wicked problems’ in public administration research. Against this backdrop, we ask the following in this article: First, what can be identified in the scholarly literature as the core properties of wicked problems? Second, which approaches are typically discussed by scholars to address wicked problems? Our objective is to establish the necessary properties of a wicked-problem concept that is parsimonious and coherent to then work out those approaches that speak well to precisely those properties. For this purpose, we surveyed a sample of more than one hundred journal articles on wicked problems in a systematic quantitative literature review. Our results bring us closer to determining on which strands of public administration research we should focus our scholarly efforts towards studying effective ways of managing wicked problems.

Key words: wicked problems, quantitative literature review, public administrations, cross-boundary collaboration, public leadership

Zusammenfassung

Vierzig Jahre Forschung zu Vertrackten Problemen - Vorschlag zur Synthese einer fragmentierten Debatte
Das Konzept der „wicked problems“ hat im Laufe der Zeit wissenschaftliche Beiträge auf vielfältige Art und Weise inspiriert. Allerdings existiert bislang in der Verwaltungswissenschaft dazu keine eindeutige Begriffsdefinition, wodurch eine Weiterentwicklung des Forschungsstandes schwierig ist. Vor diesem Hintergrund befassen wir uns in der vorliegenden Untersuchung mit folgenden Fragen: Erstens interessiert uns, welche zentralen Charakteristika von „wicked problems“ in der Literatur identifiziert werden können. Zweitens analysieren wir, welche Lösungsansätze die Wissenschaftsgemeinde für den Umgang mit „wicked problems“ diskutiert. Unser Ziel ist es, ein konzises und kohärentes „wicked problems“-Konzept und dessen notwendige Eigenschaften zu beschreiben, um im Anschluss diejenigen Lösungsansätze zu identifizieren, die mit diesen Eigenschaften korrespondieren. Zu diesem Zweck untersuchen wir in unserem systematischen, quantitativen Literaturüberblick eine Stichprobe von mehr als 100 Fachartikeln zu „wicked problems“. Unsere Ergebnisse helfen zu entscheiden, auf welche verwaltungswissenschaftlichen Forschungsstränge wir unsere Bemühungen konzentrieren können, um den Umgang mit „wicked problems“ besser zu verstehen.

Schlagworte: Vertrackte Probleme, quantitativer Literaturbericht, öffentliche Verwaltung, cross-boundary collaboration, Public Leadership

1 Introduction

For more than forty years, scholars from several fields have drawn attention to the need to contrast the distinct challenges social, distributional public policy issues present for public administrations with more technical problems. There is a broad scholarly consensus around the concern that policymakers run into serious problems when sticking to traditional scientific-rational approaches to policy-making and -implementation when dealing with complex issues, ranging from climate change and terrorism to health care (e.g., *Lindblom 1959; Ackoff 1974*).

Figure 1: Properties of Wicked Problems According to Rittel/Webber (1973)

1. Wicked problems have no definitive formulation.
2. Wicked problems have no stopping rule.
3. Solutions to wicked problems are not true-or-false, but good- or-bad.
4. There is no immediate or ultimate test of a solution to a wicked problem.
5. Every implemented solution to a wicked problem has consequences.
6. Wicked problems do not have a well-described set of potential solutions.
7. Each wicked problem is essentially unique
8. Each wicked problem can be considered a symptom of another problem.
9. The causes of a wicked problem can be explained in numerous ways.
10. The planner has not right to be wrong.

In the field of planning and design, *Rittel* and *Webber's* notion of 'wicked problems' became widespread. Concurring with many of their colleagues, they criticize: "(...) the cognitive and occupational styles of the professions – mimicking the cognitive style of science and the occupational style of engineering – have just not worked on a wide array of social problems" (1973, p. 160). In their work on wicked problems, *Rittel* and *Webber* form a two-part argument: First, they hold that public policymakers need to recognize and understand the "wicked" nature of some policy problems in contrast to the 'tame' nature of others. To characterize 'wicked problems', they introduce a set of ten properties that are listed in figure 1. Second, *Rittel* and *Webber* argue that public policymakers need to develop and consider non-standard ways of dealing with wicked problems. Most importantly, they argue that policymakers must recognize that problem definition and the process towards problem solution must be deliberative exercises aimed at balancing the assessments and judgments of those affected.

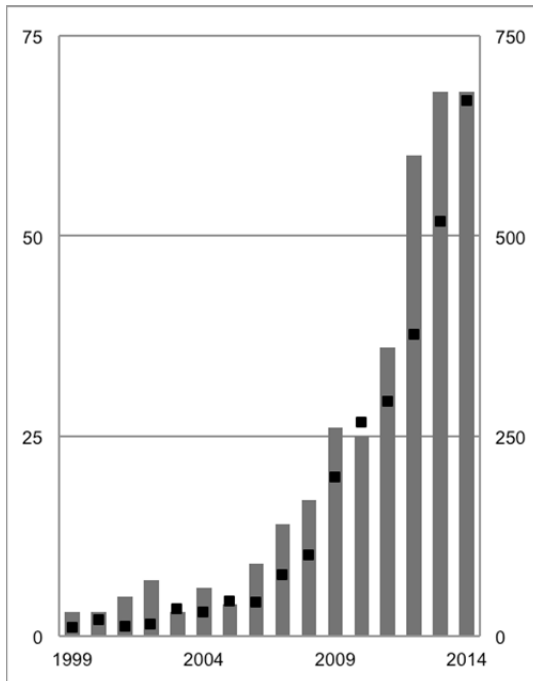
After the 1970s, however, this rich debate aroused increasingly less interest among scholars. It is only in recent years that scholars have rediscovered *Rittel* and *Webber's* notion of 'wicked problems' to understand today's policy-making challenges. A glance at publication statistics is telling: In the past fifteen years, the number of publications on wicked problems has continuously grown, and risen sharply since 2011.¹ A peak was reached in 2014 with almost seventy contributions having been published (please consider figure 2).² Similarly, citations of publications on wicked problems have risen sharply in the same period of time.³

Despite great scholarly interest in the concept, the debate on wicked problems emerges as fragmented. Consider, for example, that a total of about 3,000 citations are made in 2,700 different articles.⁴ The problem is twofold: First, wicked problems are no longer on-

ly discussed by public policy scholars, but the concept has traveled to other fields such as business research, psychology, and ethics. While the concept has inspired a diverse and interesting set of contributions, different disciplines have attached different meanings to wicked problems. Second, *Rittel* and *Webber* have not defined wicked problems in a distinctive way. According to *Ritchey* (2011, p. 26) the many properties they put forward to typify these problems may serve as ‘heuristic perspectives’ rather than as analytical concepts. Over the years, then, the concept has been used broadly to describe and label a wide range of phenomena – from climate change to diversity management. However, the lack of a clear-cut definition makes it difficult to advance and consolidate scholarly knowledge on wicked problems in public administration research. On this score, *Gerring* holds that “arguments employing such terms have a tendency to fly past each other; work on these subjects does not cumulate. Concepts seem to ‘get in the way’ of a clear understanding of things” (1999, p. 361; also *Sartori* 1984). In conclusion, we argue that only when we as scholars know what we are talking about when we talk about wicked problems, are we able to enter more purposefully into a discussion on their management.

Against this backdrop, we inquire into two questions in this article: First, what can be identified in the scholarly literature as the core properties of wicked problems? Second, which approaches are typically discussed by scholars as fruitful for addressing wicked problems?

Figure 2: Publications and Citations of Wicked Problems 1999-2014
(own compilation)



Ultimately, our objective with this article is to establish the necessary properties of a concept of wicked problems that is parsimonious and coherent. In a second step, we aim to

determine those approaches discussed in our dataset that speak well to precisely these properties.⁵ Our findings may bring us closer to an answer revealing which strands of public administration research we should focus our scholarly efforts on, with a view to studying ways of managing wicked problems.

For this purpose, we survey a sample of 105 journal articles on wicked problems in a systematic quantitative literature review. To search for patterns in this dataset, we retrieve dominant themes and arguments from these texts in an inductive manner – rather than pre-determining them. We analyze and present our results by generating a series of descriptive statistics. Such a methodological approach serves our purpose of identifying a common denominator in a fragmented debate in two ways. It allows us to map the entire body of literature on the subject of study systematically and, thus, provides for a less biased analysis of the debate than, for example, narrative literature reviews would generate. Second, by quantifying our results, we are able not only to detect regularities and peculiarities in the data, but also to give precision and rigor to the presentation of our findings.

At its core, we find that the scholarly understanding of wicked problems clusters around three inter-related properties: (1) wicked problems resist a clear solution, and they tend to become chronic; (2) the management of wicked problems involves a multitude of stakeholders with typically diverging values and interests; and, finally, (3) wicked problems defy full understanding and definition of their nature and implications.

In the scholarly discussion on ways to address wicked problems, we find that two strands of literature speak well to precisely these properties: (1) scholars point to the importance of cross-boundary collaboration. That is, they consistently find that processes towards managing wicked problems require the involvement of external stakeholders in public policymaking, inter-organizational collaboration among governmental bodies, and networked forms of governance. (2) Scholars discuss the role of public leadership and management in dealing with wicked problems. They find that addressing wicked problems requires public managers to develop distinct skills. It emerges that a change in attitude among public managers is vital in that they need to recognize that wicked problems are chronic and must be worked on continuously. In addition, collaborative competences such as negotiation and mediation skills are found to be important for public managers to balance the demands of different stakeholders. However, the scholarly literature provides only few and rather general answers as to how to improve processes of problem definition and understanding.

The remainder of this article is structured as follows: First, we explicate the methodological choices we have made for this review. Next, we detail our findings. Finally, we close with a discussion of our results and their implications for future research.

2 Data and Methods

Our dataset includes 105 peer-reviewed journal articles that contribute to the debate on wicked problems and are registered in the citation indexing service Web of Science in the period from 1991 to August 2014.⁶

To generate our dataset, we conducted a systematic search and selection of peer-reviewed journal articles (for details see Appendix A.3). In a second stage, we coded our dataset based on an interpretive coding scheme. Rather than pre-determining the coding scheme, we sought to uncover the diversity of notions and meanings associated with

wicked problems inductively from the data. We implemented the coding using qualitative data analysis software (for details on the coding scheme see Appendix A.4). Throughout the coding process, we gradually revised and consolidated the coding scheme.

Finally, we systematically assessed regularities (and peculiarities) in our data by applying the method of quasi-statistics that aims at providing estimates of frequency (cf. *Becker* 1970). We implemented this step using qualitative data analysis software (for details on data analysis see Appendix A.1).

In the next section, we report our results as numerical data to give precision and rigor to our statements about typicality and proportions; please note that we explicitly avoid more imprecise terms such as most, many, and some. However, to fully analyze our data, in a final step, we assessed the journal articles considered for this inquiry more qualitatively. By adding a more in-depth description of our evidence and quoting representative statements we report, for example, how scholars typically frame their arguments.

3 Findings

In this section, we organize the presentation of our findings around three key questions: (1) Which public policy issues are typically framed as wicked problems – and which are not; (2) what emerges as a shared understanding of the meaning of wicked problems; and, finally, (3) which approaches are studied by scholars in relation to addressing this class of policy problems.

3.1 Which Public Policy Problem is Not ‘Wicked’ These Days?

Rittel and Webber (1973) have pointed to social, distributional public-policy issues as typically being ‘wicked’, but have provided us with only few illustrations. These include public welfare, health, and education. In our dataset, scholars mention about a hundred examples of wicked problems. They can be grouped into 13 areas that are as diverse as food security, spatial planning, and management issues (see table 1). The most frequent issue area mentioned by scholars is that of environmental resource management (including e.g., water, forest, and wildfire management). This issue is addressed in more than 40 percent of all contributions. However, of all environmental issues discussed by scholars, climate change emerges as the quintessential example of a wicked problem; it is mentioned as a single policy problem in a fifth of all contributions.

Other issue areas featuring prominently in the scholarly debate are security and defense issues (including global terrorism, crime, and gun control) and health and healthcare issues (including drug abuse and addiction, anti-smoking, and genetically modified food). Both issue areas are mentioned in more than 20 percent of all contributions.

Interestingly, scholars discussing environmental management, security, and/or health issues tend to have a similar understanding of the nature of wicked problems. They focus on the question of whether such public policy problems are at all resolvable, the issue of the involvement of a multitude of disparate actors, and the challenge of pinpointing their definition. Moreover, almost all scholars (more precisely, 95 percent) addressing security and defense issues find the question of whether these problems are resolvable particularly salient. Two-thirds agree that global terrorism is impossible to tackle. The same holds true

for environmental issues: In more than 80 percent of all contributions, scholars argue that they cannot be resolved.

Which public policy problems are not wicked – but ‘tame’ (a term also introduced by *Rittel* and *Webber* in 1973)? In our dataset, scholars mention only 12 examples of tame problems, again across a broad range of issue areas. Examples include timetabling the railways, training the army, negotiating wages, building nuclear power plants, and enacting a policy for eliminating terrorism. It becomes apparent from these examples that their phrasing indicates either a problem of a more technical nature (consider e.g., building nuclear power plants), that an institutionalized negotiation framework is already in place (e.g., wage negotiations) or that the bargaining process has already been concluded (e.g., enacting an anti-terrorism policy). In conclusion, a tame problem might be understood as the outcome of settling for a response to a problem of the wicked type in contrast to negotiating its definition and solution.

Table 1: Issue Areas

Rank	Issue Area	No. of Contributions*	Share (in Percent)
1	Environmental Resource Management	43	41
	(Global) Climate Change	20	19
2	Security and Defense	23	22
	(Global) Terrorism	9	9
3	Health and Healthcare	22	21
4	Poverty, Unemployment, Social Exclusion and Social Assistance Poverty	15	14
		9	9
5	Sustainability	10	10
6	Economic Issues (e.g., Financial Crisis)	8	8
7	Energy	6	6
8	Management Issues (e.g., Risk Management)	6	6
9	Food Security	5	5
10	Spatial Planning	5	5
11	Diversity and Equality	3	3
12	Education	3	3
13	Ethical Issues	1	1

* Total number of contributions: 105 (own compilation).

3.2 What is the Problem With Wicked Problems?

We find seven distinct thematic clusters that tend to reappear in contributions on wicked problems (consider table 2). However, there is a somewhat broad consensus among scholars that our understanding of the phenomenon should cluster around three themes: *Non-resolvability*, *multi-actor environments*, and *problem definition*. These emerge as the most frequent themes in our dataset (see figure 3).⁷ While almost 80 percent of all contributions address the question of whether and how wicked problems are (re-)solvable, almost 75 percent find that the definition and (re-)solution of wicked problems typically involves a broad range of actors. Finally, almost 60 percent of all contributions refer to the challenge of identifying, defining, and describing the nature of this class of public policy problems.

These three clusters also emerge as the dominant thematic complex in that they are typically discussed in conjunction with each other by scholars (consider figure 4). The issues of resolvability and multi-actor involvement co-occur in almost half of all contribu-

tions, while the challenge of problem definition in relation to resolvability as well as multi-actor involvement jointly with problem definition are both mentioned in about 40 percent of all contributions. Let us explore these findings in more detail below by corroborating them with more qualitative evidence.

Figure 3: Ranking of Thematic Clusters According to Frequency (i.e., share as percentage, own compilation)

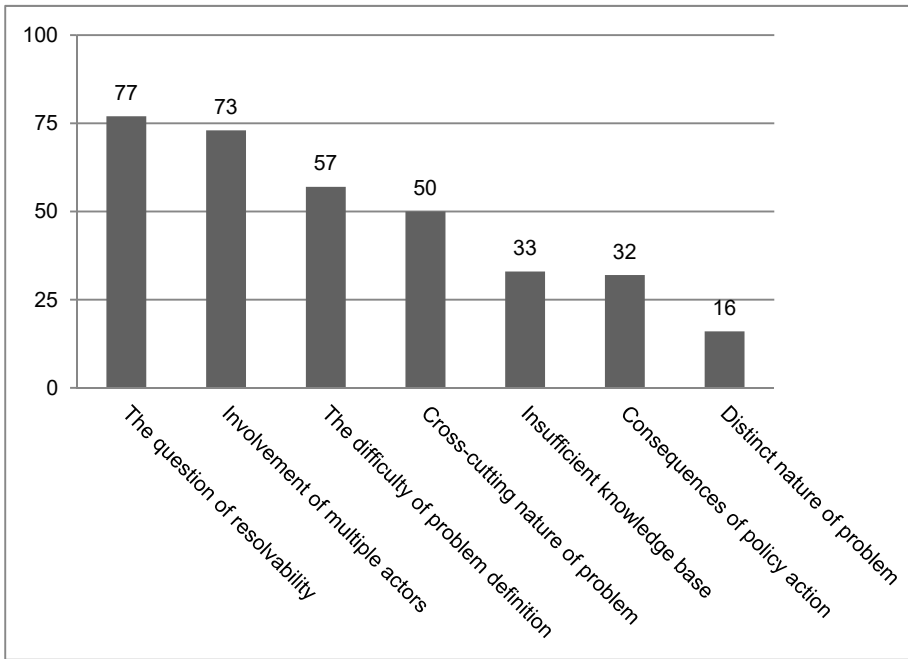
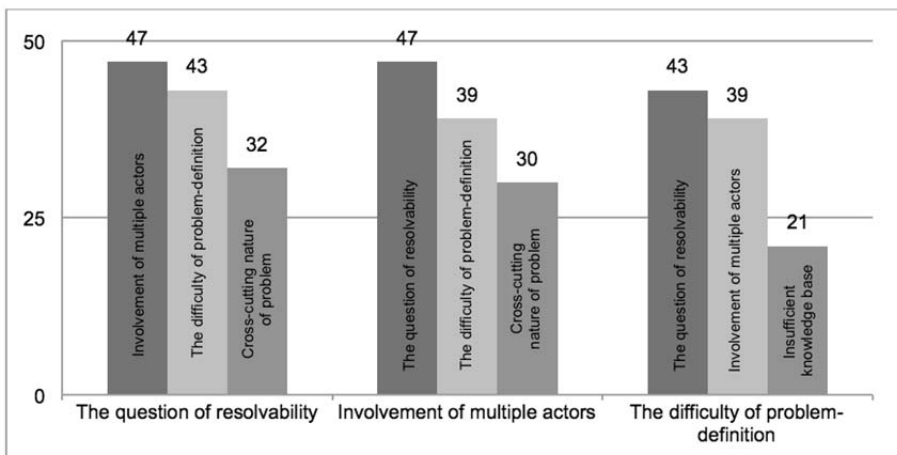


Figure 4: Co-Occurrence of Thematic Clusters (share as percentage, only ≥ 10 percent, own compilation)



1) *Are wicked problems resolvable?*

Within the thematic cluster of resolvability, it emerges as a striking pattern in our data that scholars argue almost seven times more often that wicked problems tend to be non-resolvable (in total, 48 percent) than solvable (7 percent; see table 2).

In half of these respective contributions, scholars argue that the resolution of wicked problems is typically an iterative process because they defy any definitive solution. More than that, scholars hold that any attempt to resolve such issues may exacerbate the problem, reveal new aspects of the problem, and/or generate additional, often unanticipated problems (e.g., *McGregor* 2012; *Sam* 2009; *Grint* 2005). As a consequence, wicked problems can “(...) only be re-solved – over and over again” (*Hartmann* 2012, p. 243), become “constant challenge[s]” (*Jentoft/Chuenpagdee* 2009, p. 553), or “chronic conditions” (*Rayner* 2012, p. 112). *Porteous* (2009, p. 526), among others, argues that “at best, [wicked problems] are worked on continuously, and are usually tackled in constantly changing and uncertain environments”.

Not surprisingly then, a third of scholars supporting this line of argument also reason that wicked problems only allow for temporary responses, often limited to a single or just a few aspects of the problem. Furthermore, they find that wicked problems defy any “right answers” and, as a consequence, policies tend to be perceived as imperfect and assessed along better-or-worse or good-enough lines. For example, in the case of climate change, *Grint* (2010, p. 4) concludes: “So we can make things better or worse – we can drive our cars slower and less or faster and more – but we may not be able to solve Global Warming, we may just have to learn to live with a different world and make the best of it we can.”

Yet scholars tend to argue that non-resolvability is *not* inherent to the nature of wicked problems. Rather, they relate this aspect to the broad range of actors typically involved in the policy process. 60 percent of all contributions note that the resolution (and definition) of wicked problems typically involves many actors with widely diverging interests and values. They also hold that precisely such problems are non-resolvable. Furthermore, at the same time one-fourth of them argue that wicked problems only allow for temporary and partial solutions.

In sum, we find a broad consensus among scholars that wicked problems tend to be chronic, most importantly because any policy process typically involves a diverse set of stakeholders. As *Rittel* and *Webber* (1973, p. 163) have suggested, wicked problems defy any clear solution. As a result, policy options tend to be framed as better-or-worse alternative responses and policymakers, at the very best, succeed at managing or containing such problems more or less well. However, they are often confronted with new problems created by their responses, to which they then need to adjust their actions. As a consequence, solutions to wicked problems tend to “(...) run in ‘vicious circles’” (*Fischer* 1993, p. 172).

Table 2: Frequency of (Selected) Thematic Sub-Clusters

Rank	Thematic Clusters and Sub-Clusters	Share Within Cluster (as percentage)	Share Among All Contribut. (as percentage)*
1	The Question of Resolvability		
	Wicked problems are non-resolvable	48	37
	Wicked problems are resolvable	7	6
	Resolution is uncertain and/or difficult	31	24
	Resolution is an iterative process	49	38
	No true-or-false, but imperfect and temporary responses	36	28
2	Involvement of Multiple Actors		
	The actors involved have divergent values and interests	55	40
	Wicked problems involve disagreement and conflict among the actors involved	68	50
3	The Difficulty of Problem-Definition		
	Complex nature of problem	40	23
	Problem-definition is a social process	30	17
	Problem-definitions tend to change	18	10

* Total number of contributions: 105 (own compilation).

2) *Why is the involvement of multiple actors a problem?*

Second, scholars are concerned with the observation that policy-making on wicked problems typically involves a multitude of actors. The argument featuring most prominently within this thematic cluster is that the actors involved tend to hold different views and values and to have diverging interests and agendas. As a consequence, they typically develop not only diverse interpretations of what the causes and effects of wicked problems are, but also competing proposals for their solution. This issue is addressed in more than half of all contributions attending to the aspect of multi-actor involvement (see table 2).

In almost 70 percent of those contributions, scholars find that the actors involved not only hold competing views, but also that these are often conflicting if not entirely irreconcilable. This tends to lead to deeply entrenched disagreement and controversy. At worst, policy processes end in stagnation or even deadlock. *Camillus* (2008, p. 99), for example, puts this aspect at the core of his understanding of wicked problems. He posits that “(...) the greater the disagreement among stakeholders, the more wicked the problem”.

The types of actors discussed by scholars as typically having a stake in policy-making on wicked problems range from individuals, the general public and academics to governmental organizations across different jurisdictions, non-governmental organizations, and businesses. However, only a few authors indicate that those involved are typically those affected by the problem and/or potential policy action (e.g., *Thompson/Whyte* 2012; *Ferkany/Whyte* 2012). Rather, the common reasoning is that wicked problems typically cut across multiple policy areas and, thus, transcend existing political and organizational boundaries. Almost 70 percent of all contributions attending to the aspect of the cross-cutting nature of wicked problems also argue that their management involves multiple stakeholders.

However, while multi-actor involvement is presented as a problem, another salient observation is that wicked problems defy solution by a *single* actor. Scholars find that they require collective action and coordination among those involved. *Smith/Porter*

(2010, p. 313) emphasize that wicked problems “(...) rarely fall within the mandate and responsibility of a single organization. They are likely to be intractable for any single organization to manage, requiring coordinated action by a range of stakeholders”.

In sum, we find two lines of argument: First, wicked problems are difficult to delineate from other problems and, as a consequence, taming them requires the involvement of actors from different policy areas and jurisdictions. Second, wicked problems are inherently value-laden with value conflicts being deeply entrenched in societal groups. As a consequence, the policy process on wicked problems tends to be a tough one because, by their very nature, it requires pluralistic participation, while policy implementation can only be effective if those involved coordinate their action.

3) *What makes problem definition particularly difficult?*

Within the cluster of problem definition, scholars find that the complex nature of wicked problems makes identifying and defining them a challenging task. 40 percent of contributions discussing the definitional problem hold that the causes, effects, and causal explanations of wicked problems are innumerable and interrelated in ways that are hard to grasp. *Sementelli* (2007, p. 740) explains: “The problem (...) is that wicked problems (...) possess a complex, nonlinear, almost biological sort of structure if they have an underlying structure at all”. Scholars find that, as a consequence, wicked problems tend to remain ill formulated.

Four lines of argument emerge from the data: (1) Our knowledge, including scientific knowledge, about wicked problems is typically insufficient and tends to be contested (more than 70 percent of co-occurrence); (2) it is characteristic of wicked problems that they are unique and, thus, are unlikely to have been encountered before so that knowledge about them must be built from scratch (more than 60 percent); (3) wicked problems are usually nested within related problems (almost 60 percent); and, finally, (4) wicked problems typically involve value-laden conflict among stakeholders (almost 50 percent).

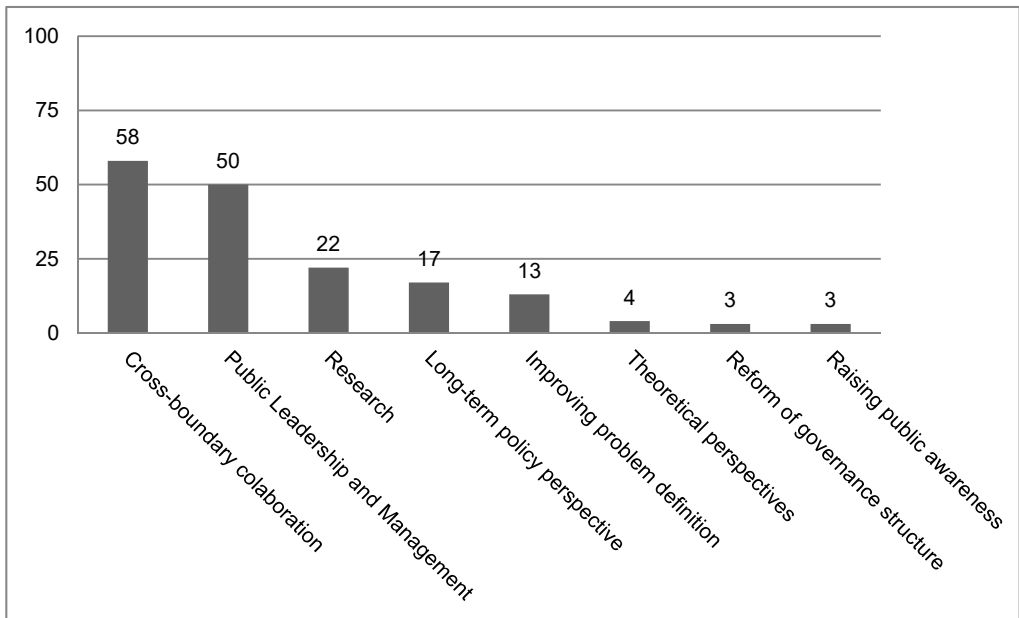
The knowledge argument adds a particularly interesting aspect to the debate on wicked problems. Scholars not only argue that (mis-)information about problems is typically puzzling and disputed, because stakeholders rely on different sources of expertise and offer diverse ‘certitudes’. Rather – and in contrast to tame, more technical problems – it is commonly held that it is inherent to the nature of wicked problems that they defy full understanding. *Mackenzie et al.* (2006, p. 161) explain that there is usually “(...) little hard data available for analysis” while *Anthony* (2012, p. 814) adds that wicked problems are bounded by “epistemological fog and unruliness”. Both scholars point in particular to the limits of scientific research for grasping the nature of wicked problems. Along the same lines, *Norton* (2012, p. 449) finds that “complex environmental problems cannot be comprehended within any of the accepted disciplinary models available in the academy”. As a consequence, they argue that wicked problems involve high levels of uncertainty – in addition to the uncertainty caused by value conflicts among stakeholders.

In sum, the causes and effects of wicked problems are typically poorly understood, not only because of their complex and distinct nature, but because knowledge and scientific authority tends to be limited and contested.

3.3 Which Approaches To Wicked Problems Do Scholars Discuss?

We identify eight thematic clusters with regard to findings on approaches to addressing wicked problems (see figure 5). Across all contributions, two thematic clusters emerge as particularly salient. First, cross-boundary collaboration is highlighted by almost sixty percent of all contributions as a key strategy for addressing wicked problems. Such a cross-boundary approach refers to collaboration among government organizations as well as with external stakeholders. Second, half of all contributions discuss the role of leadership and managerial aspects, thereby emphasizing the importance of public managers to pursue an active role in policy-making. In the following we take a closer look at these two dominant clusters.

Figure 5: Ranking of Thematic Clusters According to Frequency (share as percentage, own compilation)



3.3.1 Cross-Boundary Collaboration

First, scholars argue that wicked problems require the crossing of organizational boundaries. More than 80 percent of all contributions on cross-boundary collaboration mention the challenge of involving multiple stakeholders from both the public and the private sector (consider table 3). To tackle the cross-cutting nature of wicked problems, more than a third of all contributions to this cluster find that public administrations should span inter-organizational relationships with other governmental bodies. Moreover, networked forms of governance are discussed by almost a third of all contributions as an important organizational form to address wicked problems. Let us consider these findings in more detail.

Table 3: Frequency of (Selected) Thematic Sub-Clusters

Thematic Clusters and Sub-Clusters	Share Within Cluster (as percentage)	Share Among All Contribut. (as percentage)*
Cross-boundary Collaboration		
Involvement of multiple stakeholders	84	49
Stakeholder deliberation and dialogue	55	27
Governmental capacity building to facilitate deliberation processes	24	11
Inter-organizational collaboration and coordination	38	22
Whole of government and joined-up-government	35	8
Network governance	31	18
Challenges of network approaches	47	9
Meta-Governance of networks	37	7
Public leadership and management		
New skills for public managers	90	45
Collaborative competences	32	14
Understanding wickedness	43	19

* Total number of contributions: 105 (own compilation).

1) *How do public administrations benefit from involving external stakeholders?*

With regard to involving multiple stakeholders in the policy process more than half of all contributions find that stakeholder deliberation and dialogue are a fruitful approach to managing diverging or even competing values and interests. Engaging stakeholders gives rise to “contrasting interpretations and a plurality of solutions that in themselves reduce problems of blind spots and resident tunnel vision” (Lodge 2009, p. 406; cf. Stahl/Cimorelli 2013). Moreover, stakeholder deliberation emerges successful when it builds shared knowledge and capacity for trust and collective action (e.g., Mwangi 2009; Smith/Porter 2010; Weber et al. 2011). However, scholars also point to the risk of deadlock if conflicts are not addressed and resolved throughout the policy process. Here, it is argued that conflict management techniques such as mediation can be a useful remedy (e.g., Laws et al. 2014). Furthermore, a third of all contributions also consider the potential for learning about the problem and each other’s perspectives through such multi-stakeholder consultations (e.g., Roberts 2002; Brown/Ritchie 2006; Lodge 2009; Mwangi 2009). Deliberation is seen to provide participants with the opportunity to reflect and adapt their own positions vis-à-vis that of others (e.g., Laws et al. 2014; Scherrer/Doohan 2014).

Finally, a quarter of contributions on multi-stakeholder involvement find that government organizations need to build capacities for facilitating deliberation processes. This includes managing and leveraging stakeholders beyond hierarchical coordination (Kettl 2006), extending and creating new trust-based relationships (Weber/Khademian 2008), building coalitions and alliances (e.g., Young et al. 2012; Holman 2013), including the most change-resistant groups (Porteous 2013) as well as providing public funds for public outreach (Evoy et al. 2008).

2) *Why do wicked problems require inter-organizational collaboration among government organizations?*

More than half of all contributions on inter-organizational collaboration and coordination highlight the need for government departments and agencies to work across their organizational boundaries in order to address the cross-cutting, interdependent nature

of wicked problems. As *Schmitt* (2010, p. 17) puts it: “It is simply impossible for a single organization to be in charge of the substantive problems that require resolution” (cf. *Ferlie et al.* 2011). However, such boundary-spanning collaboration and coordination is found to be potentially hampered by fragmentation (e.g., *Hudson/Henwood* 2002), “disconnections between [government’s] silo’d institutions” (*Gollagher/Hartz-Karp* 2013, p. 2360), and departmental competition for resources (e.g., *Brown/Ritchie* 2006).

Further, we identify a more specific debate on joined-up and whole-of-government approaches, mentioned by more than a third of all contributions within the cluster on inter-organizational collaboration. At the core of this scholarly discussion is the idea to overcome fragmentation and specialization of government departments by forming partnerships across existing policy areas and government levels as a way to deliver joined-up solutions to wicked problems (e.g., *Kavanagh/Richards* 2001; *Christensen et al.* 2007; *Ferlie et al.* 2011; *Hughes et al.* 2013). However, such joined-up processes are found to challenge the traditional organization of government (e.g., *Kavanagh/Richards* 2001; *Kettl* 2006). In addition, it is cautioned that working horizontally tends to be time- and resource-intensive (e.g., *Christensen et al.* 2007).

3) *How do networks help to tackle wicked problems?*

Zooming in on the contributions on cross-boundary collaboration, we find that scholars in particular discuss networked forms of governance as an approach to managing wicked problems (e.g., *Jackson/Stainsby* 2000; *Hudson/Henwood* 2002; *Ferlie et al.* 2011). More than that, they are found to potentially “enhance democratic participation in public policy-making” (*Sorensen/Torfin* 2009, p. 234).

Further, within this cluster, more than two-thirds of all contributions are concerned with the conditions necessary for improving network governance and performance, also referred to as “meta-governance”. According to *Sorensen and Torfin* (2009, p. 235) “a reflexive and strategic meta-governance [...] combines hands-off and hands-on intervention”. In addition, meta-governance in networks is argued to be the responsibility of politicians and public managers (ibid.) that should assume “a new role of acting as a broker in the creation of value” (*Jackson* 2001, p. 5). Finally, soft steering with regard to the “provision of funding, information and expertise by government” is also discussed to potentially contribute to better network performance (*Martin/Guarneros-Meza* 2013, p. 586).

The second dominant theme discussed in this cluster is the challenges that collaborative approaches engender. These are mentioned by almost half of all contributions. Scholars in particular find a risk of conflict and deadlocks as well as a lack of transparency, accountability and legitimacy to be salient concerns (e.g., *Mwangi* 2009; *Sorensen/Torfin* 2009; *Sachs et al.* 2010). In addition, network partnerships may be challenged by the integration into formal decision-making structures (e.g., *Holman* 2013).

3.3.2 Public Leadership and Management

90 percent of all contributions addressing leadership and management issues include the finding that public managers need to catch up on distinct skills to be able to manage wicked problems. We identify two distinct clusters of skills that scholars discuss. Let us consider them in more detail:

1) *Why do policy-makers need to differentiate wicked problems from tame problems?*

In about 40 percent of all contributions concerned with skills, it is found that policy makers need to understand the problem as being wicked in nature if that is the case. It is held that “treating wicked problems as if they were tame is a sure recipe for failure” (Jentoft/Chuenpagdee 2009, p. 559) and “potentially catastrophic hence fundamentally irresponsible” (King 1993, p. 105). Solving ‘tame problems’ when actually being confronted with wicked problems has two pitfalls according to scholars. First, path dependencies and negative side effects may be caused that render addressing the problem in the future more difficult. Second, solving the ‘wrong’ problem may waste resources, including time, capacity, or windows of opportunity. Hence, scholars find that wicked problems must be recognized as such and “the particular context and the uniqueness of the problem to be solved must be taken into consideration” (Jentoft/Chuenpagdee 2009, p. 559).

2) *What are the collaborative skills that public managers need to catch up on?*

The second dominant cluster of skills discussed in the literature focuses on the collaborative competences public managers should acquire. A third of all contributions discuss the capability of managing interaction between organizations. For example, Jackson and Stainsby (2000, p. 15) conceive of public managers as “diplomats and mediators”. Others find that public managers need the ability to “liaise effectively with other organizations and external stakeholders” (Head 2010, p. 574) and create “conditions for trust-building and dialogue” (Mwangi 2009, p. 167).

4 Discussion and Conclusion

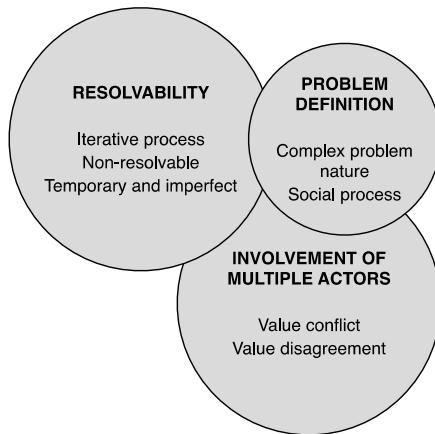
In this article, we systematically grasped the stock of literature contributing to the scholarly debate on wicked problems. We asked what the core properties of the wicked problem-concept are and which approaches for managing wicked problems are predominantly studied by scholars. Above, we detailed our implementation of a systematic quantitative literature review before assessing our findings.

Our conclusions from this literature review are twofold. First, our findings allow for condensing Rittel and Webber’s originally broad set of attributes to three properties only: Non-resolvability, multi-actor involvement, and the challenge of problem-definition (see figure 6a). Based on this finding, we argue that the common denominator of the scholarly understanding of wicked problems is that they are *chronic public policy challenges that are value-laden and contested and that defy a full understanding and definition of their nature and implications*. Along the lines of Gerring’s “Criteria of Conceptual Goodness” (1999, p. 367), such a formulation of the wicked problem-concept is at the same time parsimonious and coherent: It is parsimonious because we remove some of the concept’s definitional baggage by limiting it to three attributes only. Second, our concept of wicked problems is internally coherent because its properties are functionally related. That is, wicked problems typically cut across different policy areas and, as a consequence, organizational boundaries. As a result, they require the involvement of multiple actors with typically different values and interests. Such multi-stakeholder settings tend to result in only partial and temporary agreements among actors. As a consequence, wicked problems are usually not solved, but can only be resolved again and again and tend to become chronic.

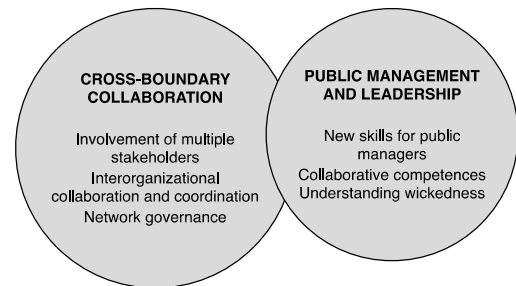
Second, we find that scholars study a myriad of approaches for coping with wicked problems. In our review we identify two dominant clusters of themes (see figure 6b). First, scholars find that cross-boundary collaboration is required to the effect of involving all relevant stakeholders within and external to government, and generating joint action among them. Not least, such collaborative processes should be deliberative and supported by tools such as mediation so that stakeholders develop an understanding of each other's position and build trust. Second, scholars ascertain that public managers need to adopt a distinct skill set including collaborative competencies and the ability to identify and understand the wicked nature of this class of public policy problems.

Figure 6: Dominant Thematic Clusters (own compilation)

a) Conceptual Properties of Wicked Problems



b) Approaches to Addressing Wicked Problems



Finally, entering into a discussion of our findings (consider table 4), we assert that (1) the aspect of non-resolvability resonates with the scholarly discussion on the role of public leadership and management in managing wicked problems; and (2) the issue of multi-actor involvement couples with the debate on cross-boundary collaboration. Yet we also find that (3) only few scholars are concerned with the nature processes towards defining and understanding wicked problems should take in order to be able to develop proposals as to their resolution.

With regard to the first two aspects, scholars find that public managers have a critical role in addressing wicked problems. Most importantly, they are responsible for not confusing wicked with tame problems when confronted with addressing the former. This entails understanding that wicked problems cannot be solved but only addressed iteratively and, at best, partially. Further, it presupposes that public managers are aware of the fact that they need to involve a broad range of stakeholders in the processes towards defining the nature of the problems and developing strategies for coping with them. To facilitate such processes, public managers need to be equipped with collaborative skills that might not necessarily fit their current professional roles.

Table 4: Synthesis of Findings

Characteristics of Wicked Problems	Approaches to Addressing Wicked Problems
Non-resolvability	Public leadership and management
Involvement of multiple actors	Cross-boundary collaboration
The difficulty of problem definition	Improving problem definition; research

However, it is to some degree surprising that the issue of managing processes towards the definition of wicked problems is largely neglected by scholars, although it emerges to be at the core of their understanding of wicked problems. They find in particular that there is a need to balance multiple perspectives on the nature and implications of wicked problems. In this regard, scholars emphasize that science needs to open up to a more participatory mode of research, which couples scientific expertise with deliberative processes aimed at solving value conflicts among stakeholders.

Hence, future research on wicked problems would benefit from exploring this important line of argument further to understand how scientific research can more purposefully contribute to a better understanding of the causes and effects of wicked problems. Not least, this is important because a consensual understanding of what the problem is should precede any attempt at coping with it.

Finally, we suggest that the scholarly debate on wicked problems should generate more insights on how to manage them in practice. However, this is beyond this article's scope. We, therefore, conclude that future research can benefit from our more parsimonious and coherent understanding of wicked problems. In turn, this may lead to more purposeful research on how to address wicked problems. Ultimately, we hope that this will inspire public administration practice.

Notes

- 1 To make sense of this increasing academic interest in wicked problems, one might consider three potential interpretations: First, the use of the concept might be ceremonial in that it has become a fashionable catchphrase to raise attention for an article; second, one might consider the allegedly altered role of the state as an active problem-solver in the wake of the post-NPM reforms during the 2000s; and finally, the vogue of the concept of wicked problems might be a side-effect of an increasing empirical interest in climate change, which is typically considered the ideal-typical wicked problem.
- 2 As recorded by the citation indexing service Web of Science, as of July 2015.
- 3 Ibid.
- 4 Ibid.
- 5 *Gerring* (1999, p. 367) has put forward a widely received list of „Criteria of Conceptual Goodness“. He argues that, among his eight criteria, parsimony and coherence are the most important.
- 6 In comparison to similar services such as JStor and GoogleScholar, Web of Science covers a broad range of social sciences journals amounting to a total of 3,000, while also allowing for limiting search results purposively e.g., according to keywords in article titles and abstracts. For these reasons, Web of Science is a useful tool for zooming in on more specific scholarly debates such as that on wicked problems without losing too much scope. However, complementing our database with JSTOR using the same algorithm as we applied in Web of Science would increase the number of contributions by 45 to a total of 150. Appendices 1-4 can be found online (<http://uni-potsdam.de/wipcad/danken-dribbisch-lange-appendix/>).
- 7 It is important to note here that the thematic clusters listed in figure 3 may be causally linked (e.g., the clusters of „difficulty of problem definition“ and „distinct nature of problem“). However, they are sought inductively from the journal articles considered for our database. We find that most authors do not reflect on the causal links between different aspects of wicked problems, but only list them. However, in the sections below, we discuss potential causal links building on the few contributions that hint at them.

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