

An Integrated Governance Approach to ‘Wicked Problems’: The Case of Antimicrobial Resistance

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Introduction

This paper addresses the problem of how to manage ‘wicked problems’ which run across different policy sectors and national borders. Based on evidence from the work on eradicating or reducing the problem of antimicrobial resistant (AMR) bacteria, the paper aims at identifying key challenges caused by wicked problems. Wicked problems are complex, open-ended and intractable, do not have a clear set of potential solutions, can be explained in numerous ways, and are characterized by low or no public tolerance of failure in solving the problems (Rittel and Webber 1973; Roberts 2000; Head 2008; Ansell and Bartenberger 2016; Candell et al. 2016). The combat against AMR clearly coincide with such definition (Eggleston et al. 2010; Wallinga et al. 2015). Based on the combination of theoretical literature and analysis of experiences from the case of AMR, the paper aims at developing an integrated governance approach to wicked problems. The ambition is that this analytical framework will increase knowledge about effective coordination and governance mechanisms.

The paper applies theoretical insights from policy-integration (Underdal 1980; Jakob et al. 2008; Jordan and Lenschow 2010; Candel and Biesbrock 2016), multi-level governance (MLG) (Hooghe and Marks 2001; Piattoni 2015; Schackel et al. 2015; Benz et al. 2016), and global governance literature (Fidler 2002; 2007; 2010; Harman 2012; Gostin and Sridhar 2014). It is moreover based on empirical insights from the case of AMR, which is one of the biggest challenges in global health governance today (Eggleston, Zhang and Zeckhauser 2010; DG Sanco 2011; DG Santé 2016a; 2016b; WHO 2015; FAO 2016; OIE 2016; The Review on Antimicrobial Resistance 2016). It is demonstrated how AMR appear as a ‘wicked problem’ in public policy-making thus challenging established mechanisms of governance. The “governance” aspect relates to the assumption that not only governmental hierarchical authority, but also other modes of coordination, such as networks of both state and non-state actors, can play a role in the coordination of public policies and governmental action (Sørensen and Torfing 2009; Ansell 2015; Ansell and Torfing 2015; Shiffman et al. 2016). Research on AMR has received widespread attention in later years, in particular within human and veterinary medicine. However, there is still a clear gap in knowledge regarding the effects and effectiveness of different governance mechanisms used to combat cross-sectorial and cross-border problems in general and AMR in particular. This paper aims at contributing to filling this gap of knowledge.

The research puzzle includes, *first*, the question related to the design of governance systems for wicked problems, including who participates in coordination efforts and where the authority and

competence for coordination is located: What are the key organizational challenges of such systems? *Second*, questions related to the content of coordination – how well policies are coordinated and integrated within the governance systems: How can policy-integration and policy-coordination contribute to reducing wicked problems? In order to limit the scope of the paper, focus is on policy-making, i.e. the process of formulating policies, regulations, strategies, action-plans etc., and not on implementation.

The paper does not offer causal explanations of specific governance configurations. Casual analysis should rather be made on a case-by-case basis. The aim of the paper is rather to develop a framework for identifying and analysing new and expedient governance mechanisms. The ambition is that this framework can be used as a tool for categorizing systems of cross-sectorial and cross-border governance and thus to generate assumptions about the scope conditions for achieving effective problem-solving solutions to ‘wicked problems’. The relevance of the analytical framework is illustrated by evidence from the European Union and other international organizations, who apply a One Health approach (see below) to AMR. Data for the study were gathered from a variety of sources: theoretical literature, empirical studies on AMR and food and health governance, public documents and interviews with key officials involved in the coordination of policies aimed at containing the problem of AMR (see list of interviews under the list of references).¹

Background: AMR as a ‘wicked problem’

AMR happens when microorganisms (such as bacteria, fungi, viruses, and parasites) change when exposed to antimicrobial drugs (such as antibiotics) (WHO 2015). The result of these changes is that medicines may become ineffective. Thus, infections may persist in the body (of both animals and humans) and the risk for diseases to spread to others will subsequently increase (ibid.). This represents a significant challenge for both health and food governance (Delogu 2016). First, it may result in lengthier stays in hospitals and more intensive care thus increasing the cost of health care dramatically. Second, it may cause a sharp increase in deaths caused by diseases that up until today have been fairly easy, to cure. Third, it may cause illness and death in millions of animals thus increasing the risk of spreading disease to humans, as well as affecting the economy of animal husbandry and food production negatively. According to estimates from late 2014, about 700 000

¹ Interviews were conducted in winter/spring 2017 in Stockholm and Brussels with officials from the European Commission, the European Centre for Disease Prevention and Control, European umbrella organizations for veterinarians, doctors and pharmaceutical industries, the Swedish government, and the Swedish permanent delegation to the EU. The interviews provided background information, guidance to relevant documents and contributed to identifying modes of AMR governance used within the food and veterinary sector and human health sector respectively.

people die every year from AMR whereas the number of annual deaths may increase to 10 million by 2050 (Review on Antimicrobial Resistance 2016: 10-11). Thus, if current trends persist, several hundred millions of people worldwide may die prematurely because of drug resistance over the next decades. The number of potential animal deaths is significantly higher. The combat against AMR thus highlights four basic challenges:

- The potential ineffectiveness of established and important medicines and thus reduced ability to treat common infectious diseases;
- The potential for the problem to spread within and across national borders – potentially affecting the health (and causing the deaths) of millions of people all over the world;
- The potential for the problem to spread through the food chain –potentially affecting food industries, food supplies and, of course animal and human health; and
- The long term/ 'creeping' character of the threat, which necessitates the enduring and proactive commitment from a wide array of stakeholders.

AMR is thus a truly global concern, which demands cooperation and coordination, across national borders. Another important characteristic of the problem is, as stated above, that it is not only rooted in human medicine, but also in veterinary medicine, animal husbandry, fish farming and feed and food production. Overuse, and misuse of antibiotics (which are the most prominent antimicrobial drugs) not only in people, but also in animals, increases the risk of AMR to develop. The fact that antibiotics often are used without professional oversight further increases the risks involved. Antimicrobial resistant-microbes can thus be found in people, animals, food, feed, and the environment (in water, soil and air) and can spread between people, animals and food/feed, as well as from person to person. In other words, antimicrobial resistant-microbes are both versatile and unpredictable by nature and have a very extensive scope (WHO 2015: 2). Implementing measures in the human health sector and the veterinary and food sectors, as well as in other relevant sectors, is thus required in order to deal effectively with the problem. Moreover, measures need to be coordinated between relevant policy-sectors.

Adding to the complexity is the fact that because free movement of people, food and animals across borders enhances the spread of antimicrobial bacteria, measures aimed at regulating trade and travel can be relevant and important. Such measures (e.g. import restrictions, import prohibitions, and border controls) may again seriously affect the economy of affected countries. Governance systems therefore need to include mechanisms for coordinating and balancing different and sometimes conflicting, concerns. The problem of AMR is thus in its nature a cross-

sectorial problem requiring cooperation and coordination between different sectors and policies, in particular between the human health sector and the food and veterinary sector. The cross-border and cross-sectorial aspects of governing AMR add to the characterization of the problem as ‘wicked’ and highlight the need to find effective problem-solving governance mechanisms.

As illustrated above, the problem of AMR is complex and open-ended. The problem has multiple cross-sectorial causes, it can be explained in numerous ways, it does not apparently have one clear fixed solution, and of course, because of its serious and dramatic impact on human health, public demand for solving the problem is extremely high. AMR is therefore, appropriately deemed a ‘wicked problem’, which is also reflected in the World Health Organization’s (WHO) description of the problem as “complex”, “driven by many interconnected factors” and as an area where “isolated interventions have limited impact” and “coordinated action is required” (WHO 2016). To meet the challenge caused by AMR, national governments, the EU, the WHO, the World Animal Health Organization (OIE) and the Food and Agricultural Organization (FAO), have all introduced so-called One Health initiatives (Leboeuf 2011; Mersha and Tewodros 2012; Chien 2013; Lee and Brumme 2013; Gibbs 2014; Woldehanna and Zimicki 2015; Lapinski et al 2015; Council of the EU 2016). One Health refers to a broad, multi-disciplinary systems-based approach to complex problems, which considers underlying structural factors such as socio-political, material, biological and economic factors, as well as analysis of the context and institutional environment in which decisions are made across all levels of society (Vandersmissen and Welburn 2014; Queenan et al. 2016: 422-423). This approach to how to govern ‘wicked problems’ clearly illustrates the relevance of both interdisciplinary studies and actions, as well as the relevance of an integrated governance approach where the need for horizontal and vertical coordination is taken into account.

Moving towards an integrated governance approach

The foundations for a cross-sectorial and cross-border governance approach

We have identified three strands of literature relevant for the governance of cross-sectorial and cross-border problems. The global health governance literature focuses in particular on the myriad of global mechanisms and measures aimed at dealing with health challenges such as the conventions, recommendations and guidelines set up by the WHO, as well as other relevant international organizations and agreements such as FAO and the World Trade Organization (WTO) (Fidler 2002; Lee et al. 2009; Harman 2012). The multi-level governance literature deals in particular, with decision-making competencies, which are “(...) shared by actors at different levels rather than

monopolized by national governments” (Hooghe and Marks 2001:3). Originally, this literature focused on the sharing of competencies within the EU between supranational institutions and national and local levels of governments, as well as on the involvement of non-state actors at different levels of governance. However, the concept of multi-level governance is relevant for a variety of areas, where different levels of authority and the problems of coordination are involved (Jordan and Schout 2006). The policy-integration literature deals with societal challenges (such as climate change), which are crosscutting the boundaries of established policy domains and require some level and/or some form of policy integration in order to be addressed (Underdal 1980; Candel and Biesbrock 2016). This literature originates from the study of environmental policies, but has been extended to cover a number of different policies (such as food safety and food security) (Ugland and Veggeland 2006; Candel and Biesbrock 2016). We combine insights from these three strands of literature in order to arrive at a conceptual framework for analyzing cross-border and cross-sectorial governance of ‘wicked problems’.

Addressing the “coordination dilemma”

Some scholars have raised questions about the potential for achieving effective coordination across both different sectors (horizontally) and different levels of governance (vertically). Peters (1998:302) links this coordination problem to network integration and formulates a hypothesis, which states that “...strong vertical linkages between social groups and public organizations makes effective coordination and horizontal linkage within government more difficult”. His argument is that once an “agreement within the network has been reached the latitude for negotiation by public organizations at the top of the network is limited” (ibid.). The basic assumption is that successful horizontal coordination may *limit* the latitude for vertical coordination and vice versa. Egeberg and Trondal (2015: 579) argue that the ‘coordination dilemma’ is underestimated in the literature and emphasize the significance of the dilemma by referring to “...the *impossibility* of combining strong coordination of implementation processes at one level of government with strong coordination across levels” (authors’ emphasis). Scharpf (1994) however, is not equally pessimistic regarding the combination of horizontal and vertical coordination. He draws a distinction between *hierarchical* coordination (democratically legitimated, contract-based, or authoritarian) and *negotiated* coordination (voluntary or compulsory) and applies game-theory to shed light on the constraints both forms of coordination face when confronted with higher levels of interaction frequency, density and volatility (Scharpf 1994: 28). He moreover highlights the potential of negotiated coordination if “embedded within hierarchical or network structures” (ibid.: 37). Thus, he implies that the question of whether different forms of coordination can be combined, and applied effectively, depends on the specific context.

The ‘coordination dilemma’ constitutes a challenge to governance. However, the argument here is that whether and how this dilemma potentially plays out is an empirical question (Kjekshus and Veggeland 2011). Moreover, to follow the arguments of Metcalfe (1994, 2000) in order to assess the role of coordination in governance and policy-making, one should take into the account the needs that arise in particular circumstances. Such needs may relate to the distribution of legal and regulatory competencies, temporal and dynamic aspects (e.g. crisis and unexpected events), and specific policy-characteristics. Thus, the latitude for coordination across sectors and levels of governance not only depends on the organizational context, but also on actor involvement, policy-context and timing of events. An integrated governance approach thus needs to take into account the concepts of coordination and policy-integration on one side and the concepts of global and multi-level governance on the other. A basic premise for this paper is that integrated and coordinated policies enhance an effective containment of wicked problems such as AMR. The challenge is to specify exactly how to coordinate (and construct) actor constellations, problem perceptions, policy objectives, instruments and implementation strategies between and across national borders, levels of governance and policy sectors in order to contain wicked problems.

Coordination across sectors: Untangling the concepts of coordination and policy-integration

In the context of this paper, coordination involves two basic aspects. *First*, coordination means identifying and bringing together the relevant actors and institutions (“the participation aspect”). *Second*, coordination means identifying and linking relevant knowledge and policies into common strategies and policies (“the material aspect”). At least two implications derive from this. *First*, governance of AMR does not necessarily represent a unique case, but can rather be illustrative of approaches to crosscutting challenges with global ramifications, such as environmental and climate policies (Urwin and Jordan 2008; Russel and Jordan 2009; Jordan and Lenschow 2010; Schout et al. 2010). *Second*, in line with Candel and Biesbroek (2016: 213), one should take on a *processual* understanding when studying coordination (and policy-integration). Metcalfe’s (1994) analysis of inter-organizational coordination and construction of a nine-point policy coordination scale stands out as an important contribution to such an understanding (Peters 1998; Schout et al. 2010: 158). Metcalfe (1994: 281) argues that coordination should not be considered as an “all or nothing” concept, but more as a “continuum”. The scales of coordination can be distinguished from each other on basis of the management capacities required at that specific scale. Moreover, the scale has a cumulative logic attached to it, thus for an upper-scale category of coordination to prevail depends on whether the capacity to accomplish the levels below is present. The conception of a coordination scale has

received criticism due to the lack of clear criteria or connotations to utilize in the categorization of empirical observations, thus making systematic comparison impossible (Candel and Biesbroek 2016: 214). Later studies have raised doubts on whether the interlinkage of different degrees of coordination operate under a cumulative logic (Jacob et al. 2008; Jordan and Lenschow 2010). Nevertheless, Metcalfe's argument that co-ordination comes in different shades is important in that it highlights the multifaceted nature of the concept. Moreover, Metcalfe (ibid.: 279) states that "the amount and form of co-ordination should be related to the needs that arise in particular circumstances" is important. Thus, when assessing specific coordination systems, it is important to take into account the characteristics of the issue and problem at hand, as well as how responsibilities and competencies are distributed in each policy- and country-specific context.

Hustedt and Syefried (2016: 891) employ Scharpf's (1994) two subcategories of negotiated coordination, i.e. *positive* and *negative* coordination, as "heuristics to direct analytical attention to particular qualities of horizontal co-ordination". Positive coordination depicts "an attempt to maximize the overall effectiveness and efficiency of government policy by exploring and utilizing the joint strategy options of several [organization] portfolios" (ibid.: 38). Negative coordination has a lower level of aspiration in that its "goal is to ensure that any new policy initiative designed by a specialized subunit [...] will not interfere with the established policies and the interests of other [organizational] units" (ibid.: 39). Thus, positive coordination represents the strongest form of coordination, which, we will argue, is required when dealing with cross-sectorial wicked issues. Moreover, when analyzing positive coordination between separate policy-areas and sectors, the concept of policy-integration becomes relevant.

Policy-integration as a concept and phenomenon has attracted considerable interest from a wide range of disciplines, including public administration and international relations. Candel and Biesbroek (2016: 217) define policy integration as "[...] an agency-driven process of asynchronous and multi-dimensional policy and institutional change within an existing or newly formed governance system that shapes the system's and its subsystems' ability to address a cross-cutting policy problem in a more or less holistic manner". By emphasizing its asynchronous nature, Candel and Biesbroek (ibid.: 215) seek to highlight the non-linearity of policy integration. Accordingly, the various dimensions of integration might unfold in different paces or even opposite directions. Thus, in terms of method, processes of policy integration have an inherent causal complexity, which generate challenges in need for accommodation in future analyses.

The policy-integration literature thus focuses on policy-making that transcends the boundaries of established policy fields. A major concern is how to achieve policy goals when managing crosscutting issues that do not correspond to the responsibilities of one particular sector or institution (such as a ministry or a governmental agency). The basic question is under what conditions such crosscutting issues can be coordinated and integrated and enter into a common public policy-making framework. Underdal (1980: 162) identifies three basic requirements for policies to be qualified as ‘integrated’: *comprehensiveness* (all significant consequences of policy decisions are recognized as decision premises), *aggregation* (policy options are evaluated on basis of their effects on some aggregate measure of utility), and *consistency* (different policy elements are in accord with each other). Inspired by James G. March’s criteria for system integration (March 1999), Ugland and Veggeland (2006: 610) have added the idea of structural connectedness to the concept of policy-integration, i.e. the relationship and connection between a policy on one hand and organizational and institutional structures on the other. The concept of “joined up government” refers to attempts at organizing government in order to produce integrated and coherent strategies, policies and results and thus more or less reflects the basic idea of structural connectedness (Pollitt 2002; Davies 2009; Kavanagh and Richards 2011). The policy-integration literature thus highlights the horizontal dimension, i.e. the distribution of competencies *across different policy-sectors*. This horizontal distribution of competencies can be specialized, setting up institutional ‘fences’ between sectors allowing public institutions to deal more or less unhindered with policies that fall within their particular field of competence (c.f. negative coordination), or it can be coordinated putting emphasis on sector cooperation and strong coordination mechanisms (c.f. positive coordination).

Coordination across levels: Untangling the concepts of global and multi-level governance

In order to capture the vertical dimension of coordination we draw on literature on multi-level governance and global health governance. One of the core questions raised in these literatures is how competencies and responsibilities are distributed across different levels of governance – from the global to the local levels. The governance system can be centralized, where much competencies are delegated to global/international/supranational institutions, or it can be decentralized, where much competency remain at national/local levels of governance. Multi-level governance (MLG) refers to decision-making competencies, which are “(...) shared by actors at different levels rather than monopolized by national governments” (Hooghe and Marks 2001:3; Schakel et al. 2015). According to Piattoni (2015: 326), MLG can be defined “as a type of policymaking arrangements” which key characteristic is “the simultaneous activation of governmental and non-governmental actors at different jurisdictional levels and such that the interrelationships thus created defy existing hierarchies

and rather take the form of non-hierarchical networks”. This particular mode of governance, arguably, can be employed as both a descriptive and a theoretical concept (ibid.: 337). Here, the concept of MLG is primarily used descriptively to categorize the multi-layeredness of existing governance arrangements. However, we do take notice of Piattoni’s (2015: 330) argument that MLG arrangements are not by themselves assurances of coordination and goal attainment. To achieve coordination within a MLG arrangement requires specific coordination, implementation and compliance mechanisms, as well as a “capacity to mobilize values, ideas and people” among the relevant actors (ibid.: 331). In order for actors to utilize such capacities, there is a need for functional lines of communication. Thus, MLG adds a “crucial dimension” to the debate on political decision-making, due to its conceptualization of policy co-ordination across territorial levels of government (Benz 2007; Benz et al. 2016: 999).

Global health governance refers to “the use of formal and informal institutions, rules, and processes by states, intergovernmental organizations, and non-state actors to deal with challenges to health that require cross-border collective action to address effectively” (Fidler 2010:4). The global health governance literature thus shares many of the concerns raised in the MLG literature, including the issue of distribution of competencies between the international, national and local levels, as well as the role of non-state actors and civil society in public policy-making (Harman 2012; Lee and Kamradt-Scott 2014; Kickbusch 2016). The global health governance literature emphasizes the need to study how different combinations of formal and informal institutions, including both hard and soft law measures, and the involvement of nation-states, intergovernmental organizations, and non-state actors, may affect the ability to deal with global health problems (ibid.). Thus, global health governance is particularly relevant when health problems spread across national borders and demand common and coordinated policies and action at the global level in order to be effectively contained. Global health law and policies do not constitute a unitary organized legal system similar to, for example the WTO and the EU. Instead, “there is a complex array of international norms, including those that are binding, or “hard” (e.g., treaties), and those that are nonbinding, or “soft” (e.g., codes of practice)” (Gostin and Shridar 2014: 1732). Moreover, businesses, foundations, and civil-society groups all play a role in the efforts to regulate and protect health concerns. Thus, global health governance is characterized by a network of state and non-state actors as well as networks of treaties and “soft” law instruments – many under the auspices of the WHO, but others under the auspices of other organizations and international legal frameworks such as the UN, WTO, OIE and FAO (ibid.). The processes of globalization where plants, food, animals and people move more frequently and rapidly across borders, and where health risks and health problems thus increasingly span borders,

have intensified the discussion on the need for collective action and international legal solutions (ibid.). Globalization involves complex processes of change in politics, markets, technologies and the environment, which challenges the problem solving capacities of individual states. Thus, global health governance highlights the needs, as well as the problems of coordination and sharing of competencies between nation-states and international organizations, between relevant international organizations, and between state actors and non-state actors.

The concepts of MLG and global health governance contribute to the identification of key challenges, which are relevant for an analytical approach focusing on the governance of cross-border problems. Relevant key dimensions are distribution of authority and responsibilities between different levels of governance – from the local to the supranational level – and the development of common solutions based on joint policies, strategies and/or legal frameworks (c.f. international coordination).

Merging cross-sector and cross-border governance into a common framework

The primary ambition of this paper is to develop an analytical framework for cross-border and cross-sectorial governance. As illustrated above, in order to grasp the comprehensiveness of such “multi-scale” governance arrangements, we include both horizontal *and* vertical coordination elements. Coordination is thus a key concept to our framework, hence the inspiration from the policy integration and (multi-level) governance literature. The former has emphasized the horizontal dimension of coordination, whereas the latter directs attention to the vertical dimension. By horizontal coordination we refer to measures which primary intention is to enhance the levels of goal-*coherence* and instrument-*consistency* among actors from different subsystems, i.e. policy sectors such as human medicine, veterinary medicine etc. Vertical coordination, on the other hand, refers to measures designed to enhance the coherence and consistency of policy processes and actions at various levels of governance. Coherence as a concept has no clear, authoritative, operationalization, which complicates comparative analysis across sectors, and admittedly needs to be addressed if the research field is to advance (Nilsson et al. 2012; Candel and Biesbroek 2016: 225). Here, we rely on Candel and Biesbroek’s (ibid.: 221; OECD 2013) understanding, who link coherence to “whether a governance system’s policies contribute jointly to – or at least do not undermine – specific objectives” (such as the containment of AMR).

The *first step* towards an integrated governance approach is to categorize coordination systems according to: 1) a vertical dimension: coordination across levels of governance; and 2) a horizontal dimension: coordination across sectors. Categorization according to these dimensions will provide

information about the *allocation of authority, competencies and responsibilities* across sectors and borders (c.f. who has competence for coordination and at what level is this authority located – the participation aspect).

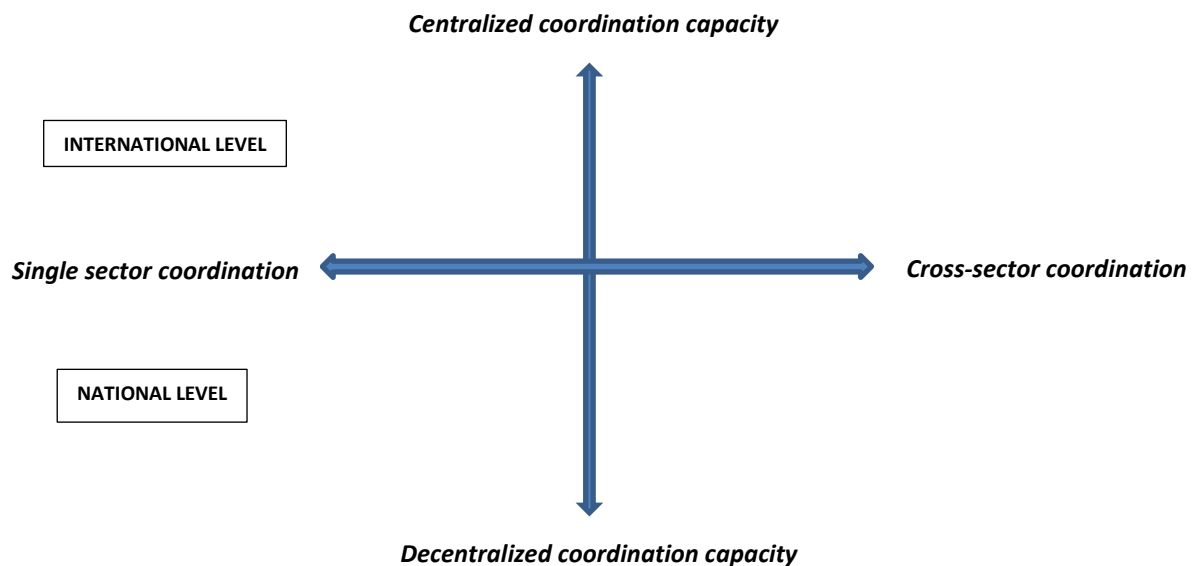


Figure 1: Categorizing cross-sectorial/cross-border coordination systems

In figure 1, coordination capacity refers to the locus of authority for coordination across different levels of governance and the resources linked to this authority. Locus of authority tells us something about the allocation of competencies and responsibilities from decentralized (local) to centralized (supranational) level. A basic precondition for the use of coordination authority to be effective is the availability of economic, administrative and technical resources (Smith 2006; DG Sanco 2011; Chien 2013; WHO 2015; DG Santé 2016a; 2016b; Marquardt 2017). The continuum from single sector coordination to cross-sector coordination refers to the question to what degree single policy-sectors are subject to inter-sectorial cooperation and coordination. Here, both formal and informal institutional frameworks for sector-coordination are important. Formalized frameworks refer to laws, regulations, and formal organizational structures such as coordination committees, coordination procedures etc. Informal frameworks refer to cultural aspects, i.e. sector-specific traditions and norms, which guide the behaviour of participants and thus affect the potential for achieving coordination and integration across sectors. Such traditions and norms can moreover also be national-specific, regional-specific etc. and thus affect the potential for coordination between states and levels of governance.

After having categorized governance systems according to the vertical and horizontal dimensions, the *next step* is to evaluate the *form and content of the coordination* (c.f. what is coordinated – the

material aspect) and whether coordination may lead to increased policy integration across sectors and levels of governance, i.e. where:

- the consequences of decisions of different authorities and relevant sectors are recognized as decision premises (c.f. *comprehensiveness*);
- policy options are evaluated on the basis of their effects on some aggregate measure of utility where all significant sectors and affected stakeholders (e.g. human health and veterinary sector) are taken into consideration (c.f. *aggregation*);
- the different policy elements of these sectors and competent authorities are in accord with each other (c.f. *consistency*);
- and where the relationship and connection between the chosen policies on one hand and information, responsibilities and authority structures on the other, are tightly connected – this relates back to the categorization presented in figure 1 (c.f. *structural connectedness*).

Based on these criteria, we address the question to what extent governance systems are coordinated and integrated around a given mandate (e.g. health protection), and develop assumptions about scope conditions for effective governance with regard to goal achievement.

Cross-border and cross-sectorial governance can thus be analysed by, first, identifying the relevant formal and informal institutions for managing the issue at hand, including authority, organizational responsibilities, legal frameworks and inclusion of non-state actors in decision-processes at different levels of governance. Second, to evaluate the degree of policy-integration, we should analyse the comprehensiveness, aggregation, consistency and structural connectedness of the policies and institutions set up to manage the problem. Further research should identify critical cases (Yin 2014) well apt for applying the integrated governance approach in order to study the effectiveness of different types of governance systems.

The Integrated Approach Illustrated: International Aspects of AMR Governance

To illustrate the empirical relevance of an integrated governance approach, we provide examples from the efforts of governing AMR at the global and EU level. The challenge of governing AMR highlights two core dimensions. First, the cross-border dimension involves a multi-level – global (such as FAO, OIE, WHO), regional (such as the EU), national and local levels – system of governance mechanisms. Second, the cross-sectorial dimension involves the need to coordinate and integrate in particular the healthcare and food and veterinary sectors, which have an impact on the effectiveness of AMR measures. When analysing how well policies are coordinated and integrated in the area of AMR, it is

important to take into account that governance of AMR covers and involves different policy sectors subjected to different systems of governance. Thus, both intra-sectorial and inter-sectorial aspects of coordination are relevant. Here, we focus primarily on the two core sectors of AMR governance: the food and veterinary sector and the healthcare sector.

Allocation of authority and responsibilities

An important difference between the food and veterinary sector and the healthcare sector is the location of substantial coordinating capacity at the international and supranational level in the former sector and much less so in the latter sector. Thus, the national level of governance remains the centre of authority for coordinating healthcare policies, whereas both the EU and global organizations such as the WTO appear as powerful authorities with regard to coordinating food and veterinary policies (Veggeland Borgen 2005). The EU in particular, has gained considerable competence when it comes to regulating and coordinating food and veterinary policies in Europe. Of course, this asymmetry in competence between the food and veterinary sector and the healthcare sector represents a big challenge for both vertical and horizontal coordination of AMR policies.

At the global level, three international organizations stand out as pivotal in the efforts to tackle the threats caused by antibiotic resistant microbes: OIE, WHO and FAO. It is also important to mention the food standards agency Codex Alimentarius Commission (“Codex”), which is a joint responsibility of FAO and WHO. Codex is an intergovernmental body involved in harmonizing international food standards in order to protect consumer health and promote fair practices in food trade. Thus, Codex is also an important part of AMR governance. All these organizations are primarily member-state driven organizations. Nevertheless, they also involve NGOs and professional experts in their activities. Non-state actors are important in both providing policy-inputs and in collaborating with public authorities in the implementation of adopted measures. WHO, OIE and FAO have important responsibilities in setting up standards, issuing resolutions and recommendations, and in drawing up guidelines and action plans. As a way of coordinating activities at the global level, the three organizations have established a common framework for cooperation. This framework is set out in a document from 2010: “The FAO-OIE-WHO Collaboration. Sharing responsibilities and coordinating global activities to address health risks at the animal-human-ecosystems interfaces. A Tripartite Concept Note” (FAO-OIE-WHO 2010). It is important to note, that FAO, OIE, and WHO, have the authority to recommend primarily non-binding measures (c.f. soft law), such as strategies, recommendations, action plans and veterinary and food standards. The WHO is also responsible for administering a binding legal framework (c.f. hard law), namely the International Health Regulations

(IHR), which aim is “to prevent, protect against, control and provide a public health response to the international spread of disease.” However, most of the initiatives of OIE, FAO, and WHO are characterized by voluntariness and the lack of effective mechanisms for ensuring enforcement and compliance in member states. Thus, the actual effect of these initiatives on AMR governance is uncertain.

The WTO, however, has a potential for playing an important role when it comes to governance of AMR, in particular with regard to trade-related aspects of food and veterinary regulations such as import restrictions, demand for risk assessment on the use of antibiotics in food and animal production etc. The WTO enacts upon a number of trade agreements² with implications for the fight against AMR. These laws are binding on the WTO member states (“hard law”). Because WTO members can fulfil their obligations under the SPS-agreement by basing their national measures on recognized international standards, the standardization activities of Codex and OIE in the area of AMR may in fact have a ‘semi-binding’ status in disputes between WTO members (Veggeland and Borgen 2005). Moreover, in contrast to the other international organizations mentioned above, the WTO has in place a powerful and effective dispute settlement mechanism. WTO's decisions in trade disputes (made via its dispute settlement mechanism) are enforceable on the involved parties. In fact, trade agreements and the dispute settlement mechanism of the WTO represent a considerable source of authority (and potential influence) in global governance (Fidler 2002: 26).

Thus, at the global level, several mechanisms for coordinating and integrating AMR-policies are in place. With the exception of WTO, most of these mechanisms are voluntary with a limited potential for effective coordination of national policies. There is moreover an asymmetry with regard to the food and veterinary sector vs. the healthcare sector – the potential for centralized coordination is clearly highest in the former sector. This asymmetry is even more evident in the EU’s governance of AMR.

In the EU in the 1990s, the European Commission’s DG Santé gained all administrative responsibilities for food safety, animal health and plant health regulation, as well as for public health regulation. In 2002, the EU merged a large number of different legislative acts into one law, the Food Law, and established one new agency, the European Food Safety Authority (EFSA), with

² The SPS-Agreement e.g. regulates the WTO member states' use of trade restricting health measures related to animal, plant and human health. Another relevant law text is the TRIPS-agreement, which harmonizes WTO member states' intellectual property protections for, among other things, patents for pharmaceutical products (such as e.g. new antibiotics).

responsibilities for providing scientific advice and communicating risks associated with the whole food chain (Ugland and Veggeland 2006; Delogu 2016; EFSA 2016). Thus, the EU has already implemented a more integrated public health policy framework (including human, animal and plant health). However, there is still a significant difference between EU competencies in the area of food safety/animal health/plant health regulation/other internal market regulations (such as the regulation of pharmaceuticals), and EU competencies in regulating other public health issues where EU competencies are weak (such as health service provision and the combat against AMR within human medicine). Thus, for health issues falling outside the scope of internal market regulation the EU and the member states either share competencies or the competencies remain firmly in the hands of national governments. In short, the EU has gained supranational authority over food and veterinary issues, whereas national regulatory sovereignty still dominates the healthcare sector. Subsequently, although the EU is actively promoting a One Health approach to the governance of AMR, the asymmetry in sector competencies limits the potential for coordination, both horizontally and vertically.

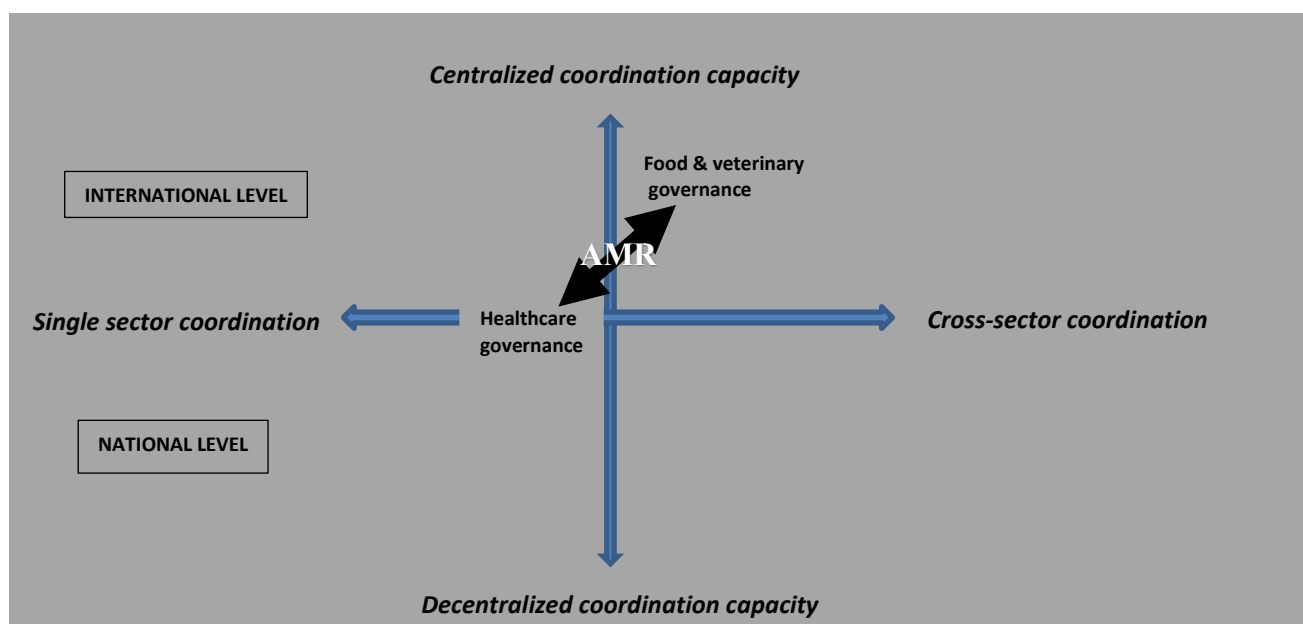


Figure 2: Governance of AMR – international aspects

Figure 2 illustrates the core international aspects³ of AMR governance: there is a stronger centralized coordination capacity available in the food and veterinary sector than in the healthcare sector. The former sector is also more coordinated horizontally, both between the sub-sectors of food safety,

³ The plotting of the two sector governance systems – healthcare governance and food and veterinary governance – in figure 2 is based on how these sectors are coordinated at the international level, by the EU and other international organizations. Thus, the figure does not say anything about coordination within nation-states.

animal health and plant health regulation, and between the food and veterinary sector and the public health sector. In order to be effective, AMR governance thus needs to take into account this asymmetry. Figure 2 does not provide information about how the food and veterinary sector and the healthcare sector are coordinated internally at the national level. Such categorization demands country-specific analysis of governance systems. It nevertheless illustrates that the level of competence and coordination capacity represents a challenge to a One Health approach – it constrains the leeway for how to coordinate.

Policy-integration and coordination: outputs of international AMR governance

Here, we focus on key outputs of international AMR governance. The aim is to provide a platform for a more detailed analysis of the form and content of coordination and policy integration at the international level. The three core global organizations involved in AMR governance have all produced documents, which set out plans to combat AMR. FAO issued in 2016 an action plan on AMR for 2016-2020 as a way to support “(...) the food and agriculture sectors in implementing the Global Action Plan on Antimicrobial Resistance to minimize the impact of antimicrobial resistance” (FAO 2016). The FAO/WHO food standards body Codex has set up an Ad hoc Codex Intergovernmental Task Force on Antimicrobial Resistance with the objective to “To develop science-based guidance on the management of foodborne antimicrobial resistance”.⁴ The OIE has developed a wide range of international standards on antimicrobial agents. It has moreover recognized that overuse and misuse of antimicrobial agents in humans, animals and plants sectors represent a big and serious challenge for global health governance. In November 2016, OIE presented a “Strategy on Antimicrobial Resistance and the Prudent Use of Antimicrobials”, which among other things stated the aim of encouraging and achieving “a sustainable change in behavior so that antimicrobial use in animals closely respects the OIE international standards on responsible and prudent use” (OIE 2016). The WHO issued in 2015 a “Global action plan on antimicrobial resistance”. The action plan sets out five objectives (WHO 2015: Foreword):

- to improve awareness and understanding of antimicrobial resistance through effective communication, education and training;
- to strengthen the knowledge and evidence base through surveillance and research;
- to reduce the incidence of infection through effective sanitation, hygiene and infection prevention measures;
- to optimize the use of antimicrobial medicines in human and animal health;

⁴ See Codex: <http://www.fao.org/fao-who-codexalimentarius/committees/committee/en/?committee=TFAMR>

- to develop the economic case for sustainable investment that takes account of the needs of all countries and to increase investment in new medicines, diagnostic tools, vaccines and other interventions.

It is interesting to note that the action plan emphasizes the need for an effective One Health approach to deal with the problem of AMR. To follow a One Health approach refer to the introduction of coordination mechanisms for a variety of international sectors and actors including of course human and veterinary medicine, as well as the agri-business. Thus, horizontal coordination is at the core of the One Health approach to fight AMR at the international level. The Global Action Plan was a result of the tripartite collaboration between WHO (human health), FAO (food and agriculture) and OIE (animal health). According to these agencies the appropriate way forward was an ambitious “whole-of-society” and One Health approach where “everybody – in all sectors and disciplines – should be engaged in the implementation of the action plan” (WHO 2015: 5). The WHO furthermore called upon member states to work out their own action plans on AMR that are aligned with the global action plan (ibid.). The Action Plan clearly emphasizes horizontal/cross-sectorial and the vertical/cross-level integrative ambitions.

The statements from FAO, OIE, and WHO, illustrate that AMR is high on the international agenda. However, the three organizations are primarily involved in voluntary coordination, which means that focus is on “soft mechanisms” such as providing knowledge, sharing information, adopting voluntary standards, and education and training. Even though they have emphasized more strongly the intentions to cooperate according to a One Health approach, their capacity for coordination is thus limited. Previous studies have pointed to the weaknesses of the One Health concept caused by dysfunctions to global governance, such as lack of an overarching authority, competition for scarce resources, donor-driven vertical programs and institutional proliferation (Leboeuf 2011; Lee and Brumme 2013: 778). Accordingly, the One Health approach of FAO, OIE, and WHO in AMR governance has so far not resulted in many substantive high-impact coordinating efforts.

The situation is somewhat different in the EU whose capacity for collective action is much stronger than the FAO, OIE and WHO. In the EU, about 25.000 people die each year from an infection due to antibiotic-resistant bacteria (European Commission 2016). Thus, the EU recognizes that AMR is a collective problem demanding collective action (ibid.):

AMR spreads through global tourism, transfer of patients between healthcare facilities within and from outside the EU, and through trade in food and animals. It is an important global economic and a societal challenge that

can't be tackled by countries or public administrations alone. Therefore, the problem needs a comprehensive "One Health" approach to it. That means that a holistic, multi-sectorial approach, involving many different sectors (public health, food safety, bio-safety, environment, research and innovation, international cooperation, animal health and welfare as well as non-therapeutic use of antimicrobial substances) is needed to tackle this complex problem

The Council of the EU has called upon both the member states and the Commission to implement a series of measures and actions to combat AMR (Council of the European Union 2016). Some measures and actions were to be taken by member states alone, some by the member states and the Commission in cooperation, and some by the Commission alone. The member states were, among other things, called upon to:

- have in place national action plans by mid-2017;
- make sure that these plans are developed and implemented in cooperation between all relevant ministries and the relevant stakeholders in the public and private sector;
- make sure that these plans include measurable goals to reduce infections in humans and animals, the use of antimicrobials in the human and veterinary sector and antimicrobial resistance in all domains; and
- within the EU One Health Network, present their national action plans and share best practices, discuss policy options, ways to better coordinate responses and keep each other updated on the progress made on the implementation of the action plans (ibid.).

The Council furthermore called upon the member states and the Commission to develop together, while respecting Member States competencies, a new and comprehensive EU Action Plan on Antimicrobial Resistance based on the One Health approach, This Action Plan should include, among other things, the following measures and goals:

- measures to prevent infections and to ensure prudent use of antimicrobials in human and veterinary medicine;
- decrease, over the period of the new EU Action Plan, the differences between Member States, in use of antimicrobials in both human and animal health, whereas Member States with a relatively low use should also try to further pursue prudent use of antimicrobials;
- decrease, over the period of the new EU Action Plan, antimicrobial resistance in humans, animals and in the environment in the EU;
- strengthen coordination and cooperation between Member States, between Member States and the Commission, and between human, food, veterinary, environmental, research and other relevant sectors and actively participate in the joint discussions of the EU One Health Network;
- strive for ambitious legislative measures that address the public health risk of AMR, in the areas where there is competence to do it, for example in the area of veterinary medicinal products and medicated feed, and
- ensure that the EU has a common approach in the global discussions on AMR, especially on the implementation of the GAP of the WHO, the FAO and the OIE Resolutions on AMR and on the

implementation and updating the intergovernmental standards related to AMR published by Codex Alimentarius and the OIE (ibid.).

The Commission was, among other things, called upon:

- to facilitate and support the regular meetings of the EU One Health Network on AMR;
- to establish a harmonised approach to prevent introduction and spread of emerging antimicrobial resistance in animal husbandry and the food chain with potential impact in public health;
- to develop as a matter of priority specific acts under the Regulation on transmissible animal diseases (Animal Health Law) including infection prevention measures, good management practices in animal husbandry and harmonised surveillance systems of relevant animal pathogens; and
- to actively promote and defend in multilateral and bilateral dialogues and agreements between the EU and its counterparts the EU standards and EU policies on AMR (ibid.).

The EU consequently promotes an ambitious agenda for the governance of AMR policies both across sectors, and between member states. The agenda of the Council illustrates the strong political will among EU members to coordinate and implement measures to combat AMR. Of course, the question remains to what extent member states actually implement the measures, which highlight the distinction between coordination at the political and bureaucratic levels (Benz et al. 2016). The adopted agenda includes both mandatory and voluntary measures and actions – depending on whether the policies fall within EU competence, shared competence, or national competence.

Thus, although the EU demonstrates a more centralized and stronger coordination capacity than other international organizations, the complex system and allocation of competence and authority create challenges for fully coordinated collective actions in the area of AMR. There is a significant potential for integrated policies and coordinated action between member states in the food and veterinary sector, where EU competencies are strong. However, it is more difficult to achieve stronger coordination and integration with other relevant sectors where the EU does not have the same competencies, such as the healthcare sector. The EU has to rely on “softer mechanisms” for coordination in these areas, such as information sharing, education, and voluntary action. Thus, so far, even in the EU, important responsibilities for policy-integration in AMR governance, i.e. the healthcare sector, ultimately remain in the hands of nation states. It is illustrating that a Swedish official involved in AMR coordination noted that the Swedish food and agricultural sector looks at the EU as a home playing field, whereas the healthcare sector looks at the EU as an away playing field (interview in Stockholm 16.02.2017).

Summarized: AMR and an integrated governance approach

Above, and illustrated by the governance of AMR, we have focused on core elements to take into account when analysing the governance of wicked problems according to an integrated approach. We have summarized these elements in table 1.

Table 1: An integrated governance approach: illustrated by AMR

<i>Degree of...</i>	Horizontal dimension	Vertical dimension
...comprehensiveness	Consequences of decisions made by different sector authorities are recognized as decision premises for the final decision on measures to be used in AMR governance.	Consequences of decisions made by different levels of authority are recognized as premises for the decision being taken by the competent level of governance.
...aggregation	Policy options for the combat against AMR take into consideration decision premises from all relevant sectors. These options are, evaluated on basis of their effects on some aggregate measure of utility.	Policy options for the combat against AMR take into consideration decision premises from all levels of governance. These options are, evaluated on basis of their effects on some aggregate measure of utility.
...consistency	By coordinating efforts made within different sectors, decision-makers make sure that the efforts are consistent and not in conflict with each other.	By coordinating efforts made at different levels of governance decision-makers make sure that the efforts are consistent and not in conflict with each other.
...structural connectedness	Connection between policies and allocation of responsibilities and authority structures between different organizations are tightly connected.	Connection between policies and allocation of responsibilities and authority structures between different levels of governance are tightly connected.

Table 1 illustrates the complexity involved in coordination of policies across both sectors and levels of governance. When applying the dimensions presented above to analyse the international aspects of AMR governance, some important differences between the healthcare sector and the food and veterinary sector are exposed. The latter sector is stronger integrated horizontally and vertically than the former. This asymmetry creates challenges with regard to coordination of AMR policies – demanding flexibility in the choice of measures and actions depending on the type of AMR policies, i.e. policies within the food and veterinary and healthcare sectors respectively. The case of AMR thus illustrates the challenges of coordination that are present between different international organizations, between different competent authorities at different levels of governance, between different nation-states, and between state actors and non-state actors. The effectiveness of coordination mechanisms moreover depends on available resources and allocation of competencies between sectors and levels of governance. As is the case for other wicked problems such as climate change and pandemics, common action on AMR deems difficult and cumbersome and may require new and legitimate modes of governance and coordination mechanisms to be established. Thus, there is a need for more in-depth

case-study analysis of the variation in systems for cross-sectorial and cross-border governance of wicked problems.

Conclusions

The ambition of this paper has been to link the One Health approach to governance of AMR to a broader literature on global health governance, multi-level governance and policy-integration, in order to develop an integrated approach to governance of wicked problems.⁵ One ambition of the paper was descriptive, i.e. based on experiences from AMR governance, to study the allocation of competencies and authorities for coordination. The aim was to identify key organizational challenges to the governance of wicked problems. Another ambition was to analyse the content of coordination, i.e. how well policies are coordinated and integrated within the governance systems. The overall aim was to develop an integrated approach to governance used to analyse to what degree different governance systems can contribute effectively to reducing wicked problems.

We have identified several key organizational challenges. First, we have addressed the coordination dilemma involved, i.e. the problem of designing systems, which can achieve strong coordination across both sectors (horizontally) and levels of governance (vertically). This challenge relates strongly to the challenge of how to coordinate sector policies where authority and competence are located at different levels of governance (i.e. EU competence for one policy and national competency for another). We acknowledge the argument of Scharpf (1994) and Peters (1998) that coordination in these instances may be difficult. However, our findings do not indicate that it is impossible (Egeberg and Trondal 2015). Coordination systems can be, and in practise are, designed to handle both cross-sectorial and multi-level challenges. However, we assume that to what degree these systems are effective in problem solving depend on how well policies are integrated (formally and informally), available resources (technical, economical), and on how well the mix of hard (mandatory) and soft (voluntary) measures is adapted to the allocation of authority and competencies. For example, the EU has the competency to adopt and apply mandatory legal food safety measures, but rely mostly on voluntary coordination between member states in the area of healthcare. The design of the governance system therefor needs to be analysed and adapted according to the specific policy *context*. The basic argument is thus that applying an integrated approach – linking cross-sectorial and multi-level aspects – provide insights necessary both to understand the mechanisms at play in the regulation of wicked problems, as well as to identify the most effective coordinating mechanisms for addressing and

⁵ C.f. the call for more social science analysis of One Health initiatives (Lee and Brumme 2013: 789).

solving them. The next step is to operationalize and apply the integrated approach to specific cases, such as carefully specified cross-sectoral and cross-country comparisons.

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