



The global governance complexity cube: Varieties of institutional complexity in global governance

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Recent decades have seen a proliferation in the number, depth and span of international institutions regulating different domains of global politics. Issues like global health, intellectual property rights, climate change and many others that were once governed by relatively distinct rulesets are today regulated by multiple institutions with intersecting mandates and memberships. As a result, the creation, evolution and effectiveness of international institutions are fundamentally shaped by how they relate to other institutions operating within their policy domains.

Yet, global governance complexes—that is, clusters of overlapping institutions and actors that govern specific policy issues—differ widely. The number and types of rulesets and actors involved, the degree of overlap between them and the extent to which overlapping rules conflict vary markedly across governance complexes and over time. The same is true for institutional responses to regulatory conflict. The broad trend towards growing institutional complexity in global governance is thus subject to important variation.

This special issue examines the nature and consequences of institutional complexity in global governance, by which we understand the growing *number*, *diversity* and *interconnectedness* of institutions and actors involved in governing global policy issues. Specifically, we explore how variation in the structures of complex governance systems may produce variation in governance outcomes. Existing literature on regime complexes (Alter & Meunier, 2009; Helfer, 2004; Raustiala & Victor, 2004) has offered detailed analyses based on the study of specific policy domains like climate change (Keohane & Victor, 2011) or intellectual property rights (Helfer, 2004). Such analyses provide an important basis for theorizing the causes and effects of institutional overlap but remain liable to selection bias and limited generalizability

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of findings.¹ Once we look beyond individual policy domains, it becomes apparent that not all institutional complexes look or behave the same. The goal of this special issue is therefore to move beyond the identification of constitutive features of institutional complexes and to focus on *variation* in institutional complexity. We focus on variation in the scale, diversity and density of governance complexes, and in the mechanisms which order relations among their constituent units—chiefly hierarchy, task-differentiation and management—as a starting point for theorizing variation in the governance outcomes they produce. In doing so, we build a foundation for comparative research on governance complexity—across policy domains, geographic regions and time. Conceptually, by allowing for variation in the structures of governance complexes, we also enhance the commensurability of different concepts of institutional complexity in global politics—from traditional regime complexes to hybrid governance systems.

We are not the first to note that the nature and degree of institutional fragmentation varies across issue-areas (Biermann et al., 2009; Henning & Pratt, 2021; Orsini et al., 2013; Young, 1996). For example, Henning and Pratt (2021) explore how different constellations of hierarchy and task-differentiation affect policy outcomes in international regime complexes. By proposing an analytical lens that hones in on systemic dimensions of institutional complexity (i.e., scale, diversity, density) which both constrain and are mediated by ordering mechanisms, such as hierarchy, task-differentiation or management, and by introducing replicable metrics that allow us to formulate and test hypotheses about how variation in each dimension impacts governance outcomes, we expand and complement this emerging research agenda.

In addition to focusing on variation in governance complexity across policy areas, we emphasize variation across time. Much extant research has sought to explain the effects of institutional complexity in particular issue areas at specific moments in time. But such snapshot depictions may blind us to important temporal changes. By examining how complex governance systems evolve, we emphasize temporal processes, such as positive reinforcement and other path-dependent mechanisms, which shape relations among institutions and may lead to different emergent properties of complex governance systems.

To explore variation in institutional complexity, we introduce the concept of a global governance complex (GGC) which we define broadly as a *system of overlapping institutions and actors that govern a particular global policy issue*.² We prefer the concept of a GGC to prevailing definitions of regime complexes for three reasons. First, although the international regime complex concept does not foreclose a focus on nongovernmental actors (Raustiala and Victor 2005; Alter & Meunier, 2009; Keohane & Victor, 2011), research on regime complexes has mostly treated states as the principal actors engaged in global governance through formal, inter-governmental institutions (Betts, 2013; Clark, 2021; Gehring & Faude, 2014; Pratt, 2018). By contrast, the concept of a GGC invites a focus on a wider range of

¹ An exception are Alter and Meunier (2009) who draw generalizations across different issue-areas.

² We build on earlier work that conceptualizes regime complexes in terms of governance complexes. See Gehring and Faude (2013) and Kahler (2016, 2021).

institutions and actors—both formal and informal, state and nonstate. In doing so, it encourages closer (re)engagement between institutional complexity studies and the literature on global governance.

Second, regime complexes have been widely associated with non-hierarchical relations among institutions whose overlapping rules and practices result in regulatory conflict (Alter & Meunier, 2009; Alter & Raustiala, 2018; Benvenisti & Downs, 2007; Raustiala & Victor, 2004). As we discuss in a following section, we do not view lack of hierarchy (formal or informal) or rule conflict as constitutive features of GGCs. The common depiction of fragmented regime complexes, featuring non-hierarchical relations, conflicting authority claims and widespread regulatory conflict represents merely *one* way in which a GGC may be organized. Beyond this ideal type, different levels of hierarchy and conflict may prevail in different governance complexes at different times. Our conception of GGCs enables us to examine the broader spectrum of this variation.

Third, by allowing for variation in governance complexity, we enhance the commensurability of different concepts and terminologies of institutional complexity in recent international relations literature—from regime complexes, institutional complexes and polycentric governance systems to hybrid institutional complexes (Abbot & Faude, 2022). Rather than competing concepts we suggest that these can be conceived as different manifestations of the same genus, a GGC, with differing values on dimensions of scale, diversity and density, and potentially subject to different ordering principles. We do not thereby want to reify categories that are fundamentally fluid (Alter, 2022). Instead, we highlight how different extant approaches have led scholars to emphasize different variable aspects of institutional complexity. Thus, rather than engaging in concept proliferation, we offer the notion of a GGC as a meta-term that may serve to enhance commensurability of terminology, data and findings in the study of institutional complexity.

Our bare-bone definition of a GGC allows us to focus on important changeable dimensions of institutional complexity. As a starting point, we draw on complex systems theory and network theory to identify three dimensions along which GGCs vary: scale, diversity and density. These concepts capture variation in the number, heterogeneity and degree of interconnectedness of the constituent units of a governance complex. Beyond these systemic features, we further identify (based on contributions to this special issue as well as the wider literature on institutional complexity) three basic mechanisms for ordering relations among constituent units: hierarchy, horizontal differentiation and management.³ These systemic features and ordering mechanisms do not exhaust dimensions of variation across GGCs. However, they capture fundamental aspects that we argue are likely to affect governance outcomes.

In addition to theorizing structural variation in GGCs, this special issue also advances new metrics of governance complexity. Existing literature has introduced

³ Interaction effects between hierarchy and task-differentiation are explored by Henning and Pratt (2021) and Green (2021). Management mechanisms are explored by Oberthür and Stokke (2011) and Abbott et al. (2015).

elaborate typologies to describe and categorize institutional complexity in global politics. However, tools of measurement have often lagged behind. Extant studies have predominantly relied on qualitative description (but see Copelovitch & Putnam, 2014; Haftel & Hofmann, 2019). Many have focused on dyadic overlaps between pairs of institutions—for example, between the World Trade Organization (WTO) and the Cartagena Protocol on questions of biosafety (Oberthür & Gehring, 2006)—or the European Union (EU) and the North Atlantic Treaty Organization (NATO) on international security (Hofmann, 2009). Others have recorded overlap in the memberships and mandates of intergovernmental institutions within specific issue areas (Gehring & Faude, 2014; Keohane & Victor, 2011; Raustiala & Victor, 2004). While such gauges provide a useful starting point for mapping institutional complexity, we argue that more fine-grained measures are needed to enable precise and reliable descriptive inferences and hypothesis-testing. Hence, several contributions to this special issue develop multi-dimensional quantitative and qualitative measures of institutional overlap aimed at facilitating systematic comparative research.

The remainder of this introduction is organized as follows. Section 1 elaborates our definition of a global governance complex. Section 2 outlines the basic dimensions along which GGCs vary. In Section 3, we introduce basic tools for measuring institutional complexity. In Section 4, we discuss how variation in the dimensions of institutional complexity may affect governance outcomes. Section 5 considers how attention to temporal processes can illuminate the causes and consequences of institutional complexity. Finally, Section 6 introduces the individual contributions to this special issue and outlines avenues for future research.

1 Defining complex global governance systems: What are we studying?

Extant work on institutional complexity (Aggarwal, 1998; Rosendal, 2001; Stokke, 2000; Young, 1996) and regime complexes reveals a bewildering array of definitions and operationalizations of the concept (Alter, 2022; Alter & Raustiala, 2018). However, consensus seems to exist on two main aspects. The first is an element of institutional overlap, meaning that the mandates or functions of two or more international institutions or organizations intersect (Aggarwal, 1998; Alter & Meunier, 2009; Raustiala & Victor, 2004; Urpelainen & Van de Graaf, 2015; Young, 1996). The second is shared membership. As Gehring and Faude (2014) explain, international institutions with entirely separate memberships will not compete, even if performing virtually identical functions (see also Alter & Meunier, 2009).

Beyond these two core features, definitional consensus soon breaks down. Areas of disagreement include the nature of the institutions and actors comprising institutional complexes, the structure of relations among component institutions and the level of conflict or dissonance characterizing their interactions.

To situate our arguments in the existing literature and to provide a basis for exploring variation in governance complexity, we introduce the concept of a global governance complex. This is not merely an exercise in re-labelling. Similar to a regime complex, we define a GGC as a system of formally separate institutions

whose memberships, mandates or functions overlap, but that operate in the absence of a formal authority empowered to resolve rule conflicts (Alter & Raustiala, 2018; Raustiala & Victor, 2004). However, our understanding of a GGC differs from existing definitions of a regime complex in three important respects.

First, regime complexes are generally defined as non-hierarchical. For example, Victor and Raustiala (2004: 279) define a regime complex as “an array of partially overlapping and nonhierarchical institutions governing a particular issue-area.” Similar definitions are provided by Benvenisti and Downs (2007), Alter and Meunier (2009), Keohane and Victor (2011) and Alter and Raustiala (2018). We agree that a single, formal hierarchy is incongruous with the notion of institutional complexity. However, as we discuss in detail later, we find that aspects or pockets of both formal, and especially informal, hierarchy may govern relations among overlapping institutions in many GGCs. We therefore leave open the question of whether, and to what degree, governance complexes are hierarchically ordered, or not, and focus instead on how variation in hierarchy influences governance outcomes.

Second, many existing accounts suggest that the rules, principles, norms and procedures of overlapping institutions must conflict (or must at least be seen as problematic vis-à-vis one another) for a regime complex to exist (Alter & Raustiala, 2018; Hale et al., 2013; Orsini et al., 2013). To our mind, this confuses a defining characteristic of institutional complexity, institutional overlap, with its potential consequence: conflict. Previous scholarship has found that relations between overlapping institutions can be sometimes cooperative (Abbott & Snidal, 2009; Clark, 2021; Gehring & Faude, 2014; Westerwinter, 2021a) and sometimes competitive (Betts, 2013; Haftel & Hofmann, 2019; Hofmann, 2009; Morse & Keohane, 2014). Literature on polycentric governance has identified rich opportunities for collaboration among overlapping institutions, depending on the types and status of the rules that overlap (Rosendal, 2001). Other studies have shown that overlapping institutions may engage in task-differentiation or niche-seeking (either deliberately or spontaneously) to reduce competition (Abbott et al., 2016; Eilstrup-Sangiovanni, 2019; Gehring & Faude, 2014; Green, 2013). We therefore treat conflict—like non-hierarchy—as a variable rather than a constitutive feature of institutional complexity.

Third, although the concept of regime complexity is not necessarily limited to intergovernmental institutions, literature on regime complexes has mostly focused on overlap among formal, legalized institutions created by states and implemented by states and intergovernmental organizations (IGOs) (Alter & Meunier, 2009; Alter & Raustiala, 2018; Benvenisti & Downs, 2007; Betts, 2013; Gehring & Faude, 2014; Keohane & Victor, 2011; Pratt, 2018; Raustiala & Victor, 2004). In contrast, we view the interaction of diverse institutions and actors—state and nonstate, transgovernmental and intergovernmental, formal and informal—as a central feature of many GGCs (Abbott, 2012; Avant & Westerwinter, 2016; Biermann et al., 2009; Green & Auld, 2017; Kahler, 2016; Westerwinter et al., 2021). As such, our concept of a GGC is more closely aligned with the notion of global governance, understood broadly as the process(es) whereby different types of institutions and actors, operating at different levels, and possessing different forms of authority, exercise governance without being formally organized into a single hierarchical system of government (Avant et al., 2010; Avant & Westerwinter, 2016; Rosenau, 1992).

Nevertheless, we acknowledge that governments and IGOs often play a central role in GGCs (Haftel & Lenz, 2022; Kahler, 2021).

On this basis, we define a GGC as a *system of governance composed of at least three international or transnational institutions or actors whose mandates, functions and memberships overlap, and that jointly address a specific policy problem.*⁴ The institutions comprising a GGC may be formal or informal, public or private. Relations among the constituent units of GGCs may be characterized by hierarchy (or its absence), by conflict or cooperation. This concept is analytically broader and more flexible than existing definitions of regime complexes in that it treats key characteristics of GGCs as variable rather than predetermined. Whereas a global governance complex is a clearly defined analytical category, specific dimensions of governance complexity may vary along a continuum.

Given this broad definition, it is important to clarify what our definition of a GGC does *not* include. First, GGCs differ from individual regimes and IGOs. For example, while the World Health Organization (WHO) is a distinct and formally independent IGO with a broad mandate that covers many aspects of global health, the governance complex addressing global health consists of the WHO, the World Bank, and a wide range of additional intergovernmental, public-private and purely private institutions (Hanrieder, 2015). Second, for a GGC to exist, institutions and actors must be involved in jointly governing an issue on a continuing basis which leads them to take account of one another's actions, even if relations between them are antagonistic. Institutions whose actions indirectly impact one another, perhaps on a one-off basis (Gehring & Oberthür, 2009), but that do not interact continually, do not form a GGC (Abbot & Faude, 2022).

2 Dimensions of governance complexity: Scale, diversity and density

We draw on theories of social systems and networks to identify three dimensions of structural variation in GGCs. In social systems theory, complexity refers to the number of elements that constitute a system and the connections between them. "The greater the number of elements and their interrelations, the higher the degree of complexity" (Anderson, 1999: 184; see also Luhmann 1975). Social network theory further suggests that the diversity of units in a system, and of the ties between them, generate systemic effects (Granovetter, 1973). On this basis, we propose that the complexity of a governance system can be conceived as function of its *scale*, *diversity*, and *density*. Scale denotes the number of constituent institutions and actors of a complex, diversity refers to the heterogeneity of these (e.g., state or nonstate, formal or informal) and density captures the number and diversity of ties between them. These are not the only variable characteristics of governance complexes. However, insights from systems theory (e.g., Waltz, 1979) suggests that these features play an important role in shaping the individual and collective behavior of component units

⁴ Our definition of a GGC specifies a minimum of three institutions or actors because many complexity dynamics only start to emerge beyond the dyad level (Orsini et al., 2013).

of GGCs (e.g., by affecting transaction costs and the mix of available resources) and thereby influence governance outcomes. Furthermore, since GGCs vary considerably across these dimensions, they provide a useful starting point for theorizing the consequences of variation in global governance architectures.

2.1 Scale

Scale—defined simply as the number of component units of a governance complex—is the most basic aspect of system complexity (Anderson, 1999). The greater the number of interlocking units in a system, the more complex that system is. We note that some GGCs comprise small numbers of institutions and actors that assert overlapping authority claims, whereas others have numerous components. The regime complex for plant genetic resources, for example, consists of a handful of international agreements and associated IGOs (Raustiala & Victor, 2004).⁵ The food security complex is also relatively small-scale with the Food and Agriculture Organization, the World Food Programme, the Food Aid Convention, the WTO and a few human rights organizations at its core (Margulis, 2013). By contrast, the regime complex governing trade (Davis, 2009) comprises numerous inter-state institutions operating at both regional and international levels. Once we focus on hybrid governance systems which include informal institutions and nonstate actors—e.g., the governance complexes for global health and climate change—scale increases further (Abbott, 2012; Hoffman et al., 2015; Kahler, 2021; Keohane & Victor, 2011).

We argue that scale matters for the dynamics of GGCs. Cooperation (whether among states or nonstate actors) operates differently with large and small numbers since both the costs of bargaining and the expected costs of monitoring or enforcing agreements increase disproportionately as the number of parties grows. More broadly, rationalist cooperation theory suggests that collective action problems are more easily resolved among small groups where transparency and trust can be more readily established (Olson, 1965). Scale may also have implications for governance costs. The greater the number of rules, procedures and actors that must be taken into account when addressing a given problem, the higher the transaction costs of governing. Larger scale—especially when combined with a high density of interactions—may make it more difficult to foresee the consequences of different actions, leading to unpredictable outcomes and heightened uncertainty (Alter & Meunier, 2009; Benvenisti & Downs, 2007; Drezner, 2009). Finally, large numbers may under some conditions increase competition for scarce resources which may, in turn, reduce inter-institutional cooperation (Abbott et al., 2016; Lipsy, 2017; Morin, 2020).

⁵ These include the International Convention for Protection of New Varieties of Plants, the Food and Agricultural Organization, the Consultative Group on International Agriculture Research, the WTO and the United Nations Convention on Biological Diversity.

2.2 Diversity

At the same time as international agreements have proliferated, the growing technical complexity of many cross-border issues has led to an increase in the diversity of institutions and actors involved in global governance (Avant et al., 2010; Lake, 2010). Longstanding IGOs have been joined by other types of institutions, including informal intergovernmental organizations (IIGOs) (Vabulas & Snidal, 2013, 2020), private transnational regulatory organizations (Abbott et al., 2016), nongovernmental organizations (NGOs) and coalitions of nonstate groups (Betsill et al., 2014; Green, 2013), transgovernmental networks (Eilstrup-Sangiovanni, 2014, 2016; Slaughter, 2004) and transnational public-private governance initiatives (Andonova, 2017; Avant & Westerwinter, 2016; Westerwinter, 2021b). Thus, many domains of contemporary global governance are characterized by a patchwork of institutions that differ in their design (formal and informal), constituencies (public and private) and spatial scope (bilateral and multilateral) (Biermann et al., 2009).

Institutional diversity is a feature of most GGCs. But some GGCs are more heterogeneous than others. Climate change governance involves many types of institutions, including formal interstate agreements and IGOs, such as the United Nations (UN) Framework Convention on Climate Change and the Kyoto Protocol, as well as public-private and purely private governance arrangements (Abbott, 2012; Abbott et al., 2016; Keohane & Victor, 2011). The GGC for international civil aviation consists of a few IGOs flanked by a larger number of private regulatory bodies and industry associations (Eilstrup-Sangiovanni, 2022). Other GGCs are more homogenous in terms of the institutions and actors they bring together. For example, the plant genetic resources and intellectual property rights regime complexes comprise mainly of formal IGOs (Helfer, 2004; Raustiala & Victor, 2004). Abbott and Faude (2022) focus on a specific type of GGC which they label a hybrid institutional complex (HIC) whose defining feature is the greater diversity of institutional forms. Beyond climate change and global health, the governance of cyber space and nuclear safety are prime examples of HICs.

Although scale and diversity may often correlate empirically, it is important to clarify that these are analytically separate features of GGCs which can vary independently. For example, the GGC governing global trade provides an example of a large GGC which is relatively homogenous (Davis, 2009; Haftel & Hofmann, 2019). By contrast, cyber space governance exemplifies a smaller GGC comprising of highly diverse institutions (Nye, 2014). Diversity is not a constant feature of GGCs but may vary over time. As Abbott et al. (2016) and Westerwinter et al. (2021) show, growth rates among different types of global institutions are not equal, raising the possibility of significant temporal changes in institutional diversity.

We suggest four ways in which diversity may influence governance processes and outcomes in GGCs. First, like scale, diversity is likely to increase the transaction costs of governing because interactions among heterogeneous institutions with different interests, practices, cultures, and jurisdictions are more difficult than exchanges among homogenous units (Abbott, 2012; Keohane & Victor, 2011; Lubell & Holahan, 2016; Raustiala & Victor, 2004). Second, diversity may boost legitimacy as the involvement of states, IGOs, NGOs and corporations lends

broader legitimacy to policy agendas (Abbott et al., 2015; Tallberg et al., 2013). Third, diversity may shape inter-institutional relationships. For example, it is plausible that diverse governance complexes enable some actors (mainly governments and IGOs) to orchestrate the actions of others (mainly NGOs and corporations) (Abbot & Faude, 2022; Abbott et al., 2015; Kahler, 2021; Tallberg et al., 2013). As such, diversity may shape ordering mechanisms in GGCs. Finally, diversity may boost effectiveness. Previous studies have suggested that overlapping institutions may create substantial added benefits if they represent different stakeholders, possess different kinds of expertise or provide for different decision-making procedures (Keohane & Victor, 2011; Oberthür & Stokke, 2011)—in short, if they are sufficiently diverse. Building on these insights, Abbot and Faude's (2022) theory of HICs points to significant benefits from interaction between public and private actors cooperating through formal and informal institutions, including enhanced performance, stronger complementarity of governance activities and greater policy coherence.

2.3 Density

Density of interactions (a concept borrowed from social network analysis) is an important systemic feature of GGCs. As we define it, density refers to the number and diversity of connections among the component units of a GGC: what system theorists label 'relational complexity' (Anderson, 1999: 184).⁶ GGCs may be more or less densely connected, with some complexes featuring minimal ties between institutions while others feature extensive links, involving multiple types of relationships ('multiplexity').⁷

A good starting point for gauging the density of interactions in GGCs is to consider the degree of overlap in institutional mandates, functions and memberships. In turn, this can be measured at the level of specific clusters of institutions or at the level of a complex as a whole (Haftel & Lenz, 2022; Reinsberg & Westerwinter, 2021a; Westerwinter, 2021a). In addition to overlap in functions or memberships, other types of connections may also be of interest, such as shared sources of funding, joint programmatic activities or sharing of personnel. Importantly, the thickness of different types of institutional ties may vary independently. For example, some institutions may overlap widely in memberships but narrowly in terms of functions, or vice-versa (Haftel & Lenz, 2022; Reinsberg & Westerwinter, 2021a). The same institutions may draw on similar sources of funding, while using expertise from separate expert communities. Density can vary both across and within GGCs in the sense that some constituent units may be more densely connected than others, giving rise to local clusters in which component institutions and actors are tightly

⁶ Density, as we define it, thus differs from the use of the term in much of the existing literature which simply captures the growing number of institutions and organizations governing an issue-area (Young, 1996).

⁷ Multiplexity is another term borrowed from social network analysis (Wasserman & Faust, 1994).

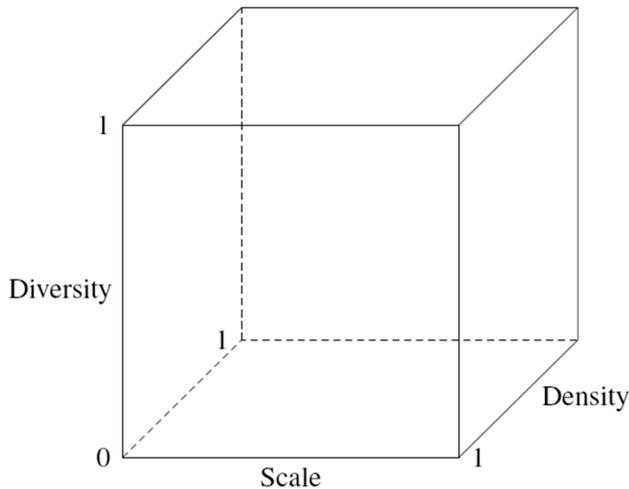


Fig. 1 The global governance complexity cube

connected to a few others from which they receive multiple inputs, while being more sparsely connected with the wider system (Westerwinter, 2021a).

The regime complex governing climate change is sparsely connected. While the intergovernmental components of the complex show moderate overlap in memberships, membership overlap between intergovernmental and public-private components is quite low. The same is true for overlap in governance functions (Abbott, 2012; Abbott et al., 2016; Green, 2013; Keohane & Victor, 2011). An example of a GGC featuring high density (or multiplexity) is the governance of private security contractors where different types of institutions overlap extensively in memberships, have similar governance functions and draw on similar sources of funding and even personnel (Avant, 2016; Westerwinter, 2021a).

Like scale and diversity, density has important implications for GGCs. A high degree of density where information, resources, policy demands and practical support are exchanged through multiple channels means that even small changes in one institution can have implications for many others, potentially setting in motion a wider process of institutional change within a policy domain (Amable, 2003; Turner & Baker, 2019). High density may also enable more effective orchestration of GGCs as different forms of interdependencies can be leveraged to manipulate the behavior of institutional intermediaries. Borrowing from network theory, one may speculate that highly connected institutions are likely to be more frequent and efficient orchestrators and serve as focal points for institutions that are more sparsely connected to a complex. On the other hand, dense overlaps in institutional mandates or functions may also stoke competition for authority and resources and reduce propensity to cooperate (Abbott et al., 2016; Gehring & Faude, 2013; Hofmann, 2009, 2018; Lipsy, 2017; Morin, 2020). As Verdier (2022) shows, high levels of functional overlap directly facilitate strategic regime shifting by governments and other actors (see also Helfer, 2004; Morse & Keohane, 2014) Fig. 1.

The basic systemic features of GGCs that we have identified—scale, diversity, density—can be represented as a three-dimensional space (a global governance complexity cube) in which different governance complexes occupy different positions. The global governance complexity cube may serve as an analytical sorting device which brings to the fore important differences between existing conceptualizations of institutional complexity in global politics. Several of the varieties of institutional complexes that Alter (2022) identifies can be conceived of as regions within the governance complexity cube. For example, first generation regime complexes tend to reside in the lower left-hand corner, featuring low diversity and often relatively limited scale and density of inter-institutional relations. Institutional complexes (as defined, for example, by Henning & Pratt 2021) may score higher on diversity (although they need not do so by definition). Transnational regime complexes (Abbott, 2012) and hybrid institutional complexes (Abbot & Faude, 2022) tend to reside further towards the back-upper-right-hand corner, being, by definition, more diverse, and generally tending towards greater scale and density. Locating existing concepts of institutional complexes within the cube illustrates their main conceptual differences and similarities and illustrates how different conceptual starting points have led scholars to fix their analytical gaze on different dimensions of institutional complexity. It thereby indicates how our notion of a GGC facilitates conceptual integration by bringing together different conversations on institutional complexity.

In addition to facilitating conceptual integration the global governance complexity cube also allows researchers to map variation in real-world GGCs in a manner which facilitates systematic comparative analysis across complexes. Observers widely agree that the climate change complex, for example, is characterized by large scale, high diversity, but limited density in terms of overlapping memberships or functions among constituent institutions (Abbott, 2012; Keohane & Victor, 2011). The GGC for plant genetic resources, by contrast, features low scale, low diversity and low density (Raustiala & Victor, 2004). Importantly, individual complexes may travel across the cube over time. For example, the global governance of private security service providers started out in the early 2000s as a small-scale, low-diversity and low-density enterprise. Over the past twenty years, the complex has grown in size, but even more so in diversity and density (Avant, 2016; Westerwinter, 2021a). Such empirical mappings provide a foundation for both cross-sectional and longitudinal comparative research that is essential to advance the study of complex global governance systems.

2.4 Intermediary ordering mechanisms

In addition to the basic systemic features identified above, we point to three structural mechanisms that order relations among the components of GGCs and mediate the effects of scale, diversity and density on governance outcomes. By ‘structural’ we mean relatively stable features of a system that influence its functioning

by specifying how component units are arranged vis-à-vis one another.⁸ Drawing on existing literature, we focus on vertical differentiation (or hierarchy), horizontal differentiation and complexity management as the chief ordering mechanisms in GGCs. As we discuss below, features of vertical and horizontal differentiation may be inherent in GGCs at their birth as a function of institutional design or they may be deliberately imposed and enforced by actors who seek to reduce negative aspects of system complexity through explicit management (Eilstrup-Sangiovanni, 2022; Green, 2013; Oberthür & Stokke, 2011). However, hierarchy and unit differentiation may also be emergent features of GGCs insofar as they arise spontaneously from the uncoordinated actions of individual units, each seeking to improve their own local fitness through strategies of deference (Pratt, 2018) or task-differentiation (Gehring & Faude, 2013).

2.4.1 Vertical differentiation

Extant work on regime complexes often takes for granted that these are non-hierarchically organized (Alter & Raustiala, 2018; Raustiala & Victor, 2004). We agree that governance complexes (like social networks more broadly) lack unified, formal hierarchy in the sense that a single peak institution is officially responsible for making political decisions which are then followed up by implementation by lower-tier institutions (Powell, 1990). However, we argue that elements of both formal and informal hierarchy are likely to order relationships between the component units of GGCs. First, although formal hierarchy may be absent at the level of a GGC as a whole, pairs of institutions may have explicit hierarchical relationships. For example, many regional trade agreements are formally nested within the broader global trade regime with the WTO at its center (Aggarwal, 1998).⁹ Second, where formal hierarchy is absent, informal hierarchy may be rife. What do we mean by this?

In a broad sense, hierarchy refers to the extent to which institutions recognize the superior authority of other institutions in defining the terms of interaction within a policy domain (Lake, 2009). While formal hierarchy is based on officially allocated roles (Aggarwal, 1998), informal hierarchy in GGCs may be grounded in unofficial relations that emerge through institutional interactions. For example, scholars have pointed to practices of deference whereby some institutions accept as authoritative the rules crafted in other institutions (Aggarwal, 1998; Green, 2021; Pratt, 2018). Others have identified routines of orchestration whereby states and IGOs mobilize intermediaries (e.g., businesses and NGOs) to tackle problems more effectively (Abbott et al., 2015; Hale & Roger, 2014). Both practices may reflect informal hierarchy.

⁸ While density refers to the quantity and quality of ties among the components of GGCs, these ordering mechanisms capture different aspects of how the institutions in governance complexes interact with each other.

⁹ As a further illustration of the role of formal hierarchy in GGCs, consider that institutions X and Y may both be formally tasked with implementing the decisions of Z. In this case, although relations between X and Y are non-hierarchical, the fact that they share a common principal is likely to influence their interactions.

More broadly, sequencing may introduce informal hierarchy in GGCs since first-comers in a governance space may acquire informational and other advantages that allow them to define the rules and procedures to which later entrants must adjust (Amable, 2003; Eilstrup-Sangiovanni, 2018, 2020; Stinchcombe, 1965). Studies have found that the design of latecomer institutions often takes explicit account of the incentives and constraints created by incumbent institutions in a governance architecture, seeking to complement existing rulesets and procedures or fill regulatory gaps (Raustiala & Victor, 2004; Reinsberg & Westerwinter, 2021a; Westerwinter, 2021c). As such, their menu of choice may be significantly constrained.

We argue that hierarchy serves as an intervening variable between the basic systemic features of density, scale and diversity of GGCs, on the one hand, and substantive governance outcomes, on the other hand. For example, whereas smaller numbers of institutions may manage to coordinate their actions effectively in the absence of hierarchical structures, an element of formal or informal hierarchy may be essential for effective coordination in large-scale GGCs. To the extent that they are seen to harbor greater authority, the existence of focal institutions (a reflection of informal hierarchy) may also award legitimacy to the agendas of GGCs and elevate some agenda items over others, thereby providing common purpose and direction to the separate efforts of diverse actors (Kahler, 2021). As Abbott and Faude suggest (2022), informal hierarchy may be particularly beneficial in highly diverse GGCs insofar as more authoritative and resourceful institutions (often governments and IGOs) may successfully orchestrate the actions of other actors (also Kahler, 2021). At the same time, they suggest, informal power-based hierarchy is also more likely to emerge as an ordering mechanism in highly diverse GGCs, given that informal institutions tend to defer to the rules of formal institutions, and infra-state, public-private and nonstate institutions defer to interstate institutions. As such, informal hierarchy may both reflect diversity and serve to harness its potentially beneficial effects. Hierarchy may also obtain among more homogeneous groups of, say, formal IGOs but is then more likely to be based on sequencing or nesting.

2.4.2 Horizontal differentiation

This second ordering mechanism refers broadly to forms of specialization whereby institutions with overlapping mandates or memberships focus on fulfilling different functions or tasks (Forman & Segaar, 2006; Gehring & Faude, 2014; Oberthür & Stokke, 2011). Importantly, horizontal differentiation (or task-differentiation) differs from institutional diversity. A system of like units (say, a GGC consisting exclusively of formal treaties and IGOs) may be horizontally differentiated if a stable division of labor emerges between them, whereas a system of heterogeneous actors may feature low differentiation if component institutions fulfil identical tasks.

Studies of functional differentiation among international institutions draw on two literatures outside the field of international relations. The first, organizational theory, observes that organizations pursue instrumental preservation goals as well as substantive output goals. Thus, many organizations will deliberately modify their goals in response to environmental stimuli, such as growing resource competition, and seek protected niches in which they can avoid direct competition with peers

(Abbott et al., 2016; Anderson, 1999; Eilstrup-Sangiovanni, 2019). A second perspective, anchored in organizational ecology, holds that task-differentiation occurs through a competitive selection process (Abbott et al., 2016; Morin, 2020). On this view, individual institutions are generally too rigid to adapt to environmental stimuli. Instead, task-differentiation may evolve automatically from repeated interactions among institutions which lead some institutions to expand and others to contract or which cause duplicate institutions to go out of business.

Whether deliberate or non-deliberate, horizontal differentiation is likely to mediate the effects of scale, diversity and density on governance outcomes. Whether a GGC is large or small, diverse or homogeneous, densely or sparsely connected, functional differentiation tends to reduce the potential for rule conflict and strategic forum-shopping since individual institutions focus on distinct tasks which make them less substitutable (Henning & Pratt, 2021; Pratt, 2020). By contrast, institutions that perform similar functions are more likely to experience jurisdictional conflict and competition as states are freer to engage in regulatory arbitrage (Pratt, 2020). Functional differentiation may also facilitate inter-institutional cooperation as individual institutions specialize in complementary tasks (Henning, 2021; Westerwinter, 2021a). On the other hand, too high a degree of functional differentiation may reduce potential benefits from institutional competition and resulting innovation (Lipsy, 2017). This raises the question of when task-differentiation is beneficial for GGCs and when not (see Alter, 2022). We return to this question in the concluding section.

Building, implicitly or explicitly, on theories of complex adaptive systems (Anderson, 1999; Turner & Baker, 2019), some scholars have suggested that complex governance systems naturally evolve towards growing task-differentiation. For example, Gehring and Faude (2013) argue that ongoing interactions within regulatory institutional complexes tend to lead from inter-institutional conflict to an established division of labor which reduces conflict (see also Biermann et al., 2009; Henning & Pratt, 2021; Morin, 2020). We think that it depends. Institution-led differentiation requires access to resources in the form of demand for new forms of regulation, availability of funding and access to professional expertise in order to alter institutional practices and build new expertise (Eilstrup-Sangiovanni, 2022). Importantly, it also requires a measure of institutional autonomy that allows bureaucratic agents to pursue strategies of specialization independently of their principals who may prefer to retain options for forum-shopping. Barring instances where differentiation is imposed top-down via treaty-reform (Eilstrup-Sangiovanni, 2022), the potential for successful task-differentiation may thus depend on the resource-endowment and organizational flexibility of individual institutions.

Capacity for differentiation may also be a function of the scale and diversity of a GGC. Diverse institutions may find it easier to differentiate functionally, as informal institutions can be more easily adapted to work around formal ones (Abbot & Faude, 2022). Equally, smaller groups may find it relatively easier to reach an efficient division of labor. This again illustrates how ordering mechanisms in GGCs may both reflect and mediate basic systemic features of scale, diversity and density.

2.4.3 Complexity management

A third ordering mechanism that features widely in extant literature is complexity management. Defined by Oberthür and Stokke (2011: 6) as “conscious efforts by any relevant actor, or group of actors, to address and improve institutional interaction and its effects”, complexity management may appear to subsume many of the decentralized adaptation processes discussed above. However, as we define it, complexity management refers exclusively to *deliberate* (as opposed to spontaneous or uncoordinated) efforts whereby actors seek to improve inter-institutional interactions by strategically (re)designing the structural features of a governance complex. As such, complexity management involves the creation (or manipulation) of relatively fixed and stable institutional mechanisms aimed at facilitating inter-institutional collaboration. Complexity management thereby differs from short-term or ad hoc cooperative efforts whereby actors coordinate daily activities around specific projects or objectives. The latter may be a result of successful complexity management but is not synonymous with it.

One strategy for managing governance complexity is ‘contextual design’ whereby new institutions are created with complementary designs and layered on top of existing ones to fill gaps in governance architectures (Abbot & Faude, 2022; Reinsberg & Westerwinter, 2021a; Westerwinter, 2021c; Yeo and Hofmann 2021). Complexity management may also entail re-designing existing institutions. For example, Eilstrup-Sangiovanni (2022) shows that governments frequently merge or break up intergovernmental institutions or alter their mandates to reduce task duplication and limit jurisdictional conflict. A third management tool involves the creation of permanent cross-cutting institutions or interagency coordinating mechanisms, intended to harmonize institutional interactions (Forman & Segaar, 2006; Oberthür & Stokke, 2011). These can be relatively centralized, encompassing most institutions in a complex, or they can take more decentralized forms as when two or more institutions adopt joint decision-making structures (Stokke 2000; Henning, 2017; Westerwinter, 2021a) or merge their operations on a permanent basis (Eilstrup-Sangiovanni, 2022). Finally, complexity management may include institutionalized strategies of orchestration and meta-governance (Abbot & Faude, 2022; Abbott et al., 2015; Oberthür & Stokke, 2011; Zelli et al., 2020). As relatively fixed and centralized institutional structures, these mechanisms differ from the day-to-day collaborative exchanges and coordination efforts between individual institutions which we discuss further below.

Like vertical and horizontal differentiation, complexity management may mediate the effects of scale, diversity and density on the functioning of GGCs and help actors to harness collective benefits of institutional complexity (Oberthür & Stokke, 2011). On the other hand, individual actors may also employ management strategies to further particularistic interests. As Mattli and Seddon (2015) emphasize, orchestration has important distributive implications and the enhancement of collective efficiency is not always the primary motivation of orchestrators. Like our other ordering mechanisms, complexity management may be better suited to some institutional environments than others. For example, as a GGC grows in size, each component unit has less incentive to bear the cost of management. Thus, larger GGCs may be more likely to be ordered through spontaneous processes of

competitive task-differentiation or informal hierarchy, rather than through deliberate management.

3 Measurement

We have defined a global governance complex as a system of overlapping institutions and actors that govern a particular policy issue. Institutional complexity, in turn, denotes the degree to which these institutions are (a) many or few, (b) similar or diverse and (c) densely or sparsely connected in terms of overlaps in their memberships, mandates, specific governance functions or resource basis. To gain a better understanding of the dynamics of governance complexity, we must be able to empirically gauge each of these dimensions—separately and jointly.

Literature on institutional complexity has paid only limited attention to questions of measurement. For example, questions of scale have not featured prominently in the literature. Institutional diversity, while playing an important role in some approaches, is rarely quantified and measured. When it comes to density, most studies have distinguished broadly between overlap in institutional memberships (Sommerer & Tallberg, 2019) and overlap in functions (Hofmann, 2011; Rosendal, 2001; Urpelainen & Van de Graaf, 2015; Young, 1996). Overlap has typically been treated as binary; two institutions either do or do not overlap (Haftel & Hofmann, 2019). Given growing overlap between institutions of global governance, such measures may be too simplistic. Rather than a binary concept, institutional overlap is a question of degree and may take different forms (Haftel & Lenz, 2022; Reinsberg & Westerwinter, 2021a).

Given the small size of this special issue, we cannot aspire to develop a comprehensive toolbox for measuring global governance complexity. Instead, we merely take a few steps in that direction. Assuming that scale and diversity are a priori easier to record and measure than institutional density, we focus mainly on the latter. For example, Haftel and Lenz (2022) propose a set of quantitative measures that gauge overlap among intergovernmental institutions along three dimensions. A first measure considers direct overlap between pairs of institutions, calculated on the basis of their overlap in memberships and the policy areas in which they have competency (dyadic overlap). A second measure considers whether institutions overlap in core competencies which are central to their activities or whether overlap occurs merely in flanking competencies. A third measure (directed dyadic overlap) focuses on imbalances in overlap between institutions that are unequal in terms of memberships and policy competency. Haftel and Lenz illustrate these measures by applying them to IGOs included in the Measures of International Authority dataset (Hooghe et al. 2019), identifying significant cross-sectional and temporal variation in the extent to which major IGOs overlap (see also Reinsberg & Westerwinter, 2021a).

Another measure of institutional density is offered by Reinsberg and Westerwinter (2021a). Focusing again on IGOs, they measure membership overlap between sets of IGOs as the share of common member states between them and functional overlap based on the cosine similarity of the issue areas in which two IGOs are active as well as the governance tasks they have in common. From this, they generate a measure of institutional overlap, which combines these constitutive

dimensions. They use this metric to map overlap among IGOs across issue areas and over time, and across different types of organizations.

Other recent measures developed by contributors to this special issue seek to capture ties among different types of global governance institutions. For example, Westerwinter (2021c) uses a similarity metric that gauges the overlap of governance tasks between IGOs and TGIs. Using this measure in statistical analyses of TGI creation, he finds that transnational governance initiatives are the institutional means of choice when it comes to governing functional spaces that are relatively unexplored by IGOs. In related work, he uses the same measure to explain IGO participation in transnational governance initiatives (Westerwinter, 2021d).

Detailed measures of institutional density are important for several reasons. First, they allow scholars to track temporal changes in patterns of governance complexity. Second, they allow researchers to formulate and test hypotheses about how different kinds of institutional ties—e.g., overlap in core and peripheral competencies or between informal and formal institutions—impact governance outcomes. Detailed measures of overlap may also help to clarify practices like institutional deference. Previous studies have suggested that institutions with weaker member states tend to defer to institutions with more powerful members (Pratt, 2018). An alternative testable hypothesis might be that institutions for whom an issue over which several institutions assert conflicting authority claims is peripheral will defer to institutions for whom that issue is a core competence.

Importantly, more fine-grained complexity measures may help to illuminate causes as well as effects of complexity. Haftel and Lenz (2022) find that overlap among major IGOs has roughly doubled from 1970 to 2020. This trend, they find, has been driven mostly by the expansion of individual IGOs' policy competencies such that they encroach upon adjacent institutions, rather than by growing overlap in IGO memberships or by the creation of new organizations with similar policy competencies to incumbent ones. Understanding how institutional overlap arises may in turn facilitate inquiry into the role of different actors (member states, international bureaucrats) in driving growing institutional complexity (Haftel & Lenz, 2022).

4 Governance outcomes

To be of more than parochial interest, variation in institutional complexity must be of relevance to issues that scholars and policy-makers care about, such as the ability to effectively address pressing problems of global pandemics, poverty and climate change (Alter, 2022). Many observers have worried that institutional complexity promotes narrow interests while reducing overall governance effectiveness. Overlapping institutional mandates may produce gridlock as the lack of formal hierarchy yields a proliferation of veto points, and conflicting rulesets encourage non-compliance and opportunistic forum-shopping (Alter & Meunier, 2009; Benvenisti & Downs, 2007; Drezner, 2009; Hafner-Burton, 2009; Raustiala & Victor, 2004). Other accounts are more optimistic in suggesting that overlapping institutions may create substantial added benefit if they employ complementary governance instruments, represent different stakeholders or provide for different decision-making

procedures (Abbott & Snidal, 2009; Gehring & Faude, 2013, 2014; Keohane & Victor, 2011; Oberthür & Stokke, 2011).

We do not posit either benefits or drawbacks of institutional complexity as such. Questions, such as “do GGCs enhance or reduce governance effectiveness” or “does governance complexity lead to conflict or collaboration” are, we believe, unanswerable on their own terms given variation in GGCs, and given the absence of systematic comparison to other types of governance systems.¹⁰ Instead, we seek to theorize effects of specific features of GGCs for outcomes of central concern to scholars, including inter-institutional collaboration, problem-solving capacity and distributional outcomes. Other important outcomes come to mind, including the effects of governance complexity for legitimacy and accountability. Yet, given the limited scope of this introduction, we do not address these here.

As a starting point, we focus on identifying broad effects of our three basic systemic variables: scale, diversity and density. These effects, for the most part, do not capture more nuanced interactions between the basic features of a GGC and intermediate ordering mechanisms of vertical and horizontal differentiation or management, which are explored further in individual contributions to this special issue. Proceeding in this way, we seek to understand the effects of individual variables before adding more layers to our analysis. It is not our ambition to make strong causal claims about the definitive effects of any single dimension of institutional complexity. With the exception of greater scale generally leading to higher transaction costs, we do not expect any of our systemic features to have unconditional effects. Instead, we suggest, these features may serve as conceptual building blocks for the construction of middle-range theories that explain the effects of certain combinations of systemic features for specific outcomes of interest. With this in mind, we stop short of developing full-fledged hypotheses but rather attempt to lay the conceptual groundwork for doing so by suggesting some initial outcomes of interest which are explored further in individual contributions to this issue.

4.1 Collaboration

Institutional collaboration captures the extent to which the constituent elements of a GGC cooperate to address shared problems by, for example, sharing information, knowledge or expertise, co-financing projects or coordinating policies. Partnerships in which two or more institutions permanently pool their resources to address shared problems are a particular form of collaboration which can generate new formal or informal institutions, thus constituting a form of (semi-permanent) complexity management (Andonova, 2017; Betts, 2013; Westerwinter, 2021a). However, collaboration may also take more ad hoc forms as actors cooperate on a case-by-case basis to achieve specific substantive goals. It is this second form of collaboration that interests us here.

¹⁰ We thank Bob Keohane for this point.

How do the scale, diversity and density of GGCs affect collaboration among constituent units? Starting with scale, we suggest that GGCs comprising large numbers of institutions and actors incur higher transaction costs of collaboration than single integrated regimes or smaller complexes (Keohane & Victor, 2011; Raustiala & Victor, 2004). Although larger scale may provide unique opportunities for collaboration among smaller subsets of institutions, at the system level, we therefore expect growing scale to result in lower levels of inter-institutional collaboration.

We expect density to have similar effects: a high degree of overlap in the mandates or functions of constituent institutions increases the potential for competition over scarce resources and thereby reduces incentives for collaboration (Hofmann, 2009; Lipsy, 2017). For example, Eilstrup-Sangiovanni (2022) demonstrates how the growing scale and density of the GGC for civil aviation in the mid-twentieth century led to intense resource competition which undermined previously established patterns of collaboration. To be sure, growing density may also have beneficial effects insofar as competition for resources and policy turf may stimulate experimentation and innovation (Lipsy, 2017). Insofar as such benefits exist, however, they arise from competition rather than collaboration.

The effects of diversity are more ambiguous. Abbott and Faude (2022) argue that diversity facilitates inter-institutional collaboration insofar as dissimilar institutions are more likely to offer complementary governance instruments and less likely to view each other as rivals (see also Abbott & Snidal, 2009; Gehring & Faude, 2013, 2014; Keohane & Victor, 2011; Oberthür & Stokke, 2011). On the other hand, diversity may also increase the transaction costs of governing because interactions among institutions with different interests and cultures are more cumbersome.

Although we do not develop the point here, we expect the effects of scale, diversity and density on collaboration to be mediated by the prevailing ordering mechanisms within a GGC. For example, Abbott and Faude (2022) hypothesize that greater institutional diversity is associated with vertical differentiation in GGCs, which in turn suppresses regulatory conflict and enhances inter-institutional collaboration. Likewise, the potentially negative aspects of large scale on collaboration are likely to be reduced by effective complexity management or (given the difficulty of supplying centralized management for large groups) by horizontal task-differentiation which may reduce competitive pressures.

4.2 Problem-solving capacity

In contrast to collaboration (which denotes the extent to which institutions coordinate policies or exchange resources), problem-solving capacity refers to whether a GGC has the potential to effectively address the problem(s) it strives to govern. Given the substantive complexity of many contemporary global problems (e.g., climate change, migration or cyber-security), effective problem-solving often requires access to a broad range of information, expertise and knowledge (Abbott & Snidal, 2009; Avant et al., 2010). Given uncertainty surrounding the causes and potential solutions to many contemporary governance problems, effective problem-solving also requires innovation and learning by the actors involved (De Búrca et al., 2014;

Keohane & Victor, 2011). Diverse expertise, learning through experimentation and capacity for institutional innovation and adaptation are thus important aspects of problem-solving capacity. Rather than capturing how well a GGC governs a particular policy problem, these aspects capture more fundamentally its potential to do so. Thus, our notion of problem-solving capacity differs from the effectiveness of global governance institutions (Gutner & Thompson, 2010; Young, 2011) but constitutes a prerequisite of good performance.¹¹

How do systemic features of GGCs affect problem-solving capacity? Theoretically, scale, diversity and density can either enhance or reduce problem-solving capacity under different conditions. Larger GGCs bring together the resources and expertise of a broad range of actors that can be leveraged to address specific problems (Abbott & Snidal, 2009; Avant et al., 2010). A more diverse pool of expertise and knowledge is likely to facilitate experimentation and innovation (De Búrca et al., 2014; Keohane & Victor, 2011; Oberthür & Stokke, 2011). Less obviously, a high degree of overlap in the mandates and functions of institutions comprising a GGC (high density) may enhance problem-solving capacity by providing a basis for frequent exchange of information and knowledge which facilitates learning (Keohane & Victor, 2011; Reinsberg & Westerwinter, 2021a). In theory, therefore, larger scale, greater diversity and higher density may enhance collective problem-solving capacity. Whether or not this potential can be realized, however, is likely to depend on intervening variables, such as the degree of informal hierarchy or functional differentiation, which can be relied upon to facilitate effective coordination and reduce duplication (Abbott & Faude, 2022; Gehring & Faude, 2014). In the absence of either vertical or horizontal differentiation, we expect that dense overlaps in the mandates and memberships of component institutions will tend to fuel competition and, in doing so, reduce the problem-solving capacity of GGCs (Alter & Meunier, 2009; Hofmann, 2009; Lipsy, 2017).

In line with this logic, Abbott and Faude (2022) argue that HICs—whose component institutions possess different forms of authority, address different targets, utilize different governance techniques and which feature strong elements of informal hierarchy—offer a superior substantive fit to many contemporary governance problems compared to homogeneous complexes. Similarly, Kahler (2021) finds that diversity in GGCs increases the resources available for governing specific problems and enhances rule enforcement based on the monitoring and enforcement activities of a broader array of actors. Finally, Westerwinter (2021d) argues that cooperation with governments and nonstate actors may enhance IGO performance due to access to a wider array of material and political resources.

¹¹ Note that our interest is not in the capacity of a single institution to resolve a specific problem but in the capacity of a GGC as a whole to deliver a range of collaborative endeavors which enable problem solving (Lubell et al., 2017).

4.3 Power and distributive conflicts: Qui bono?

A central preoccupation of regime complexity literature has been to investigate the ways that power is articulated and exercised within institutional complexes. Some scholars have argued that opportunities for strategic action through forum-shopping and regime-shifting strengthen the hand of powerful governments given their resource and informational advantages (Alter & Meunier, 2009; Benvenisti & Downs, 2007; Busch, 2007; Drezner, 2009; Hafner-Burton, 2009). Others have found that regime-shifting can benefit stronger and weaker states alike. For example, regime shifting may allow weaker players, such as developing countries, to bypass institutional settings dominated by coalitions of powerful states (Faude & Große-Kreul, 2020; Helfer, 2004).

Verdier (2022) moves this debate forward by analyzing two types of regime-shifting in GGCs—one that benefits weaker parties, another which favors powerful players. His analysis, which models regime-shifting within GGCs as an inside option involving a temporary departure from cooperation within a regime, rather than an outside option involving a permanent break of cooperation, shows that weaker countries are the most likely to benefit from regime-shifting in the long run. He further demonstrates that regime-shifting (much like escape clauses and informality) belongs to the kit of bargaining tools that increase flexibility and thereby facilitate long-term cooperation.

Such benefits notwithstanding, we suggest that—on average—the greater difficulty and higher transaction costs of navigating complex institutional environments implies that the growing scale and density of many GGCs favors states and IGOs who possess the necessary resources to maneuver in complex environments compared to NGOs and many corporate actors. Insofar as larger and more heterogeneous GGCs create demand for centralized coordination and steering, this will also tend to benefit resource-rich states and IGOs relative to other actors. Thus, the larger, denser and more diverse a GGC is, the more likely it is that states and IGOs will act as focal points for other institutions' activities and to establish benchmarks around which operations and discourses converge (Kahler, 2021). Nevertheless, in some issue-areas (e.g., human rights and environmental protection), non state actors may also possess critical information or control other essential resources which allow them to act as effective orchestrators (Abbott & Snidal, 2009; Avant et al., 2010).

5 Evolution of global governance complexes

Our three-dimensional concept of global governance complexity allows us to compare GGCs according to their scale, diversity and density. Importantly, it also allows us to focus on change within governance complexes over time. Complex governance systems do not arise from a single blueprint but develop through ongoing interactions among separate institutions and actors (Raustiala & Victor, 2004). As a result, GGCs are inherently dynamic structures. GGCs change, for example, through the exit or entry of new institutions and actors (Young, 1996), through the expansion of

existing institutions (Haftel & Hofmann, 2019; Raustiala & Victor, 2004) or through the re-negotiation of institutional relationships (Gehring & Faude, 2014).

This dynamic nature of GGCs raises several questions. Do governance complexes tend to expand or contract over time in terms of the number of their constituent units? Do constituent units become more diverse over time? Does the nature of connections between component institutions change? Do GGCs, for example, tend to move towards greater vertical or horizontal differentiation, thereby reducing inter-institutional conflict (Biermann et al., 2009; Gehring & Faude, 2014; Henning & Pratt, 2021; Morin, 2020; Pratt, 2018)? Or do they grow evermore fragmented and conflict-ridden as powerful actors exploit opportunities for strategic forum-shopping, regime-shifting and competitive regime creation (Benvenisti & Downs, 2007; Drezner, 2009; Morse & Keohane, 2014)? Under what conditions might we expect to observe one or the other trajectory?

To explore the evolution of governance complexes, several papers in this special issue adopt a longitudinal perspective. Eilstrup-Sangiovanni (2022) explores how deliberate top-down and emergent bottom-up processes of differentiation and coordination have coevolved in the GGC for international civil aviation governance during the twentieth century, leading to a pattern in which the entry of new actors initially upset existing exchange relationships but eventually triggered strategies which reestablished a stable division of institutional labor. Long-term processes of contestation and accommodation are also the focus of Verdier's article (2022) which examines the effects of regime-shifting. He shows that whereas unexpected shocks can prompt dissatisfied actors to challenge existing institutions through regime-shifting or rival regime creation, rationalist notions of efficiency dictate some form of reintegration of rival institutions to re-capture lost cooperation gains. This highlights that inter-institutional conflict is not a constant feature of GGCs but a dynamic process through which renegotiation can take place (Zürn, 2018).

A temporal perspective also focuses attention on how self-reinforcing or path-dependent processes give rise to different emergent properties of GGCs. New agreements in the context of GGCs are not created on a clean institutional slate but take into account pre-existing institutional constraints and opportunities (Raustiala & Victor, 2004; Reinsberg & Westerwinter, 2021a; Westerwinter, 2021c). This suggests strong downstream effects of early institutional choices. For example, it is plausible that the early introduction of rival intergovernmental institutions in a policy domain will promote further institutional fragmentation by lessening incentives to compromise within existing fora. But it is also possible that GGCs may be subject to non-linear processes, whereby the same explanatory mechanism triggers different outcomes (Gunitsky, 2013). For example, Eilstrup-Sangiovanni (2022) illustrates that the growing scale of the GGC for civil aviation initially sparked a process of competitive task-differentiation. Over time, however, mounting resource pressures led institutions to engage in alliance-building and institutionalized resource exchanges in order to survive. Although strategic task-differentiation and alliance-building are qualitatively different outcomes, they were responses to the same initial stimulus.

In addition to revealing temporal factors which promote either conflict or coordination within GGCs, a focus on the evolution of GGCs may serve to identify and

distinguish proximate and systemic drivers of global governance complexity. Existing scholarship associates institutional complexity closely with a particular moment in time: the post-Cold War era. As Kahler notes (2021), the near-simultaneous emergence of a number of governance complexes across different issue areas, beginning in the 1990s, begs for an explanation. Alter and Raustiala (2018: 9-10) concur: “[t]he signature feature of twenty-first-century international cooperation ... is arguably not the regime but the regime complex.” There can be little doubt that institutional complexity is on the rise in many domains of global governance, as documented by Haftel and Lenz (2022). However, institutional overlap is not exclusively a recent phenomenon. For example, the governance of international civil aviation was by most measures more complex in the early twentieth century than today (Eilstrup-Sangiovanni, 2022; see also Fioretos, 2021). This historical variation is analytically productive. If all areas of global governance were growing simultaneously more complex, it would be relatively more difficult to isolate causes of growing institutional complexity. A focus on both temporal and spatial variation may help analysts to separate systemic drivers of institutional complexity (e.g., the revolution in information and communications technology which has facilitated transnational organization, the rise of new global powers or the spread of neo-liberal ideologies which encourage private, market-based solutions to many global policy problems) from proximate causes (say, negotiation deadlock in specific IGOs or issue-specific technological shocks). By encouraging comparative research across policy domains and across time, this special issue seeks to identify both issue-specific, proximate causes and wider systemic causes which contribute to global governance complexity.

6 Conclusions, individual contributions and future research

The goal of this special issue is not to construct or test a single theory of institutional complexity in global governance. Instead, we offer some basic conceptual tools that speak to a common set of theoretical, empirical and methodological questions and illustrate how these may advance the research agenda on global governance complexity. Specifically, by moving beyond a definition of GGCs that presupposes a certain relationship between constituent institutions and actors, we seek greater precision in how governance complexity can be operationalized, measured and compared across policy areas and over time. Our starting point is that one cannot posit benefits or drawbacks of institutional complexity as such. Rather, we must harness comparative research to specify which specific aspects of overlapping governance authority may have which effects under which circumstances.

Building on the conceptual framework outlined in this introduction, individual contributions to this special issue develop and test new theoretical arguments about the consequences of variation in the features of GGCs and the drivers of their temporal development. Using new data and combining qualitative and quantitative measures of institutional complexity, they demonstrate that GGCs vary considerably across issue areas and over time. In doing so, they chart new theoretical and empirical ground in the study of global governance.

In their contribution, Yoram Haftel and Tobias Lenz develop new quantitative measures of institutional complexity in global governance based on the overlap among IGOs. They introduce dyadic, weighted, directed dyadic and monadic measures of overlap and apply these measures to the 78 IGOs contained in the Measure of International Authority data. Their analysis reveals significant cross-sectional and temporal variation in overlap among major IGOs. Importantly, they show that growing overlap between major IGOs has not led to a reduction in their individual or collective authority (see also Haftel and Lenz 2021).

Kenneth Abbott and Benjamin Faude introduce the concept of hybrid institutional complexes “comprising heterogeneous interstate, infra-state, public–private and private transnational institutions, formal and informal.” The core difference between HICs and conventional regime complexes is the greater diversity of institutional forms within HICs. Because of this diversity, HICs operate differently than regime complexes in two significant ways: (1) HICs exhibit relatively greater functional differentiation among component institutions, and as a result suffer from relatively fewer overlapping claims to authority; and (2) HICs exhibit greater informal hierarchy and as a result facilitate stronger ordering through mechanisms such as orchestration. These structural features generate specific governance benefits, including enhanced substantive fit for multi-faceted governance problems and political fit for the preferences of diverse constituents, but also have potential downsides in the form of high coordination and transaction costs.

In her contribution, Mette Eilstrup-Sangiovanni analyzes the evolution of the GGC for civil aviation since the early-twentieth century. Specifically, she explores how states have attempted to mitigate rule conflict within the GGC by dissolving or merging existing institutions or by re-shaping their mandates, and how institutional actors have engaged in bottom-up strategies of adaptation in lieu of state-led reform. These twin mechanisms of top-down restructuring and bottom-up adaptation, she argues, ensure that GGCs tend to (re)produce elements of order over time—albeit often temporarily. Rather than evolving towards ever-greater fragmentation and disorder, complex governance systems thus tend to fluctuate between greater or lesser (dis)order.

Daniel Verdier presents a formal model of regime-shifting. He conceptualizes regime-shifting as a three-period game which involves an initial agreement, an unsatisfied subset of members who shift the interpretation or implementation of the agreement to a forum that is biased in their favor and, finally, a renegotiation of the initial agreement. His model makes two contributions to extant literature. Formally, the analysis moves beyond dominant outside option models of regime-shifting which treat regime-shifting as a permanent break of negotiations, to an inside option model which conceives regime-shifting as a temporary bargaining move. Substantively, the article models two scenarios of regime-shifting, one that works for the weak and another that works for the powerful, and then tests (and rejects) the widespread assumption that powerful countries are generally better able to exploit regime-shifting to their advantage than weaker countries.

In her concluding comments, Karen Alter takes stock of the existing literature on institutional complexity in global governance and links existing and emerging scholarship to the broader agenda of this special issue. Although she states some

reservations about subsuming the concept of an international regime complex under the broader umbrella of a GGC, she highlights the need to integrate institutional complexity studies more systematically into broader debates on global governance and calls for a stronger focus on policy relevance as a priority for future research.

Together the articles in this special issue suggest multiple avenues for future research. We conclude by highlighting three. First, we have suggested that variation in the basic systemic and structural features of GGCs offer a promising starting point for theory-building. By formulating and exploring hypotheses about individual and joint effects of basic explanatory variables, such as scale, diversity and density, individual contributions to this special issue begin to investigate the relationship between variation in these basic features of GGCs and global governance outcomes. However, further theorizing (and empirical testing) is needed to clarify the relationships between systemic features of GGCs and specific global governance outcomes. In addition, further dimensions of variation may be relevant to explore, beyond the basic systemic features of scale, diversity and density highlighted in this article.

One aspect of theorizing that is of particular importance is the relationship between the systemic features of GGCs and policy outcomes over time. In the short run, the systemic features along which we examine variation in governance complexes can be considered exogenous to institutional behavior and to governance outcomes. In the long run, however, it is plausible that institutional collaboration and adaptation may lead to changes in the scale, diversity and density of governance complexes as well as in the degree of hierarchy, horizontal differentiation and management within them. This highlights the importance of longitudinal analyses of GGCs and emphasizes the importance of developing non-linear theories of institutional complexity in global governance.

Second, an important goal of this special issue is to conceptualize and operationalize variation in global governance complexity in a way that facilitates better data collection and more precise observation and measurement. Abbott and Faude (2022) provide important first steps towards empirically mapping the complexity of HICs. Haftel and Lenz (2022) and Reinsberg and Westerwinter (2021a) develop new quantitative measures for capturing complexity across a broad range of IGOs, issue areas and over time. Future research may combine these strands and develop more nuanced measures that allow researchers to empirically gauge the complexity of governance complexes consisting of heterogeneous institutions (Reinsberg & Westerwinter, 2021b; Westerwinter, 2021c).

Third, although we emphasize how structural features of GGCs shape governance outcomes, individual contributions to this special issue also highlight the importance of agency within GGCs. The systemic and structural features of GGCs we have identified present the actors that operate within them with specific opportunities and constraints. While some actors may succeed in navigating institutional complexity to advance their goals, others may become marginalized. This points toward the need for more nuanced theories of how different configurations of governance complexity empower or weaken different types of actors (Verdier, 2022). It also opens avenues to explore how the systemic features of GGCs may be strategically manipulated by the state and nonstate actors maneuvering within them (Eilstrup-Sangiovanni, 2022). At the intersection of agency and the structural characteristics

of GGCs lies a host of under-explored questions related to complexity management. How can management efforts be tailored toward the systemic and structural features of governance complexes? Which management instruments can be used by what actors? While extant work on interplay management and orchestration provides a useful theoretical starting point, more conceptual and empirical work is needed to generate implementable information for policy-makers and practitioners on how to successfully manage governance complexity.

Taken together, this research agenda promises to bring about a deeper understanding of the emergence, evolution and effects of global governance complexes. Such research will also inform theories of international cooperation more broadly, as these still focus disproportionately on individual institutions. Finally, this research agenda promises to illuminate complex interdependencies among different types of formal and informal institutions in contemporary global governance.

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