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The Frontiers of Networked Governance

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Abstract

By making use of governance networks that may self-organize within bounds to help support certain policy-making functions, networked governance integrates distributed capacities for problem solving and policy-making. For policy problems harbouring a given level of complexity, the higher the level of social capital within an identified governance network, the more autonomy and self-organization may be conducive to achieving problem solving functions, and thus positive governance outcomes. We explain the efficacy of networked governance as a factor of both problem complexity (network heterogeneity) and social capital. Social capital is the fabric of trust, shared values and understanding that allows diverse participants to work together towards collective outcomes and common goals.

Problems of higher complexity, requiring networks of greater heterogeneity, demand a certain level of social capital to enable effective collaborative processes. The paper suggests that a combination of stakeholder analysis and social network analysis can be useful in assessing the network structures and practices that may be used to maintain and enhance social capital, and thus improve the effectiveness of networked governance processes. We also suggest that creating shared value can be promoted by using collaborative visioning processes, which fosters shared visions and strategic alignment between network actors, thus facilitating the achievement of collectively desirable outcomes and common goals of sustainable development. Collaborative visioning enhances common understanding, and so may increase social capital, and allow more complex problems to be addressed in the future and otherwise improve the effectiveness of a networked governance approach. Finally, we discuss the role of institutional brokering and agency in fostering desirable network structures and practices that promote social capital and the effectiveness of collaborative processes.

Acknowledgements

IISD's interest in networks goes back to the early 1990's. The two early milestones that follow are worth specific mention. First is the report, *Connecting with the World: Priorities for Canadian Internationalism in the 21st Century*, delivered by a task force chaired by Maurice Strong (1996). This report focused on the need to accelerate the creation of substantive knowledge, and the need for knowledge-based networks to multiply, disseminate and expand knowledge. The other milestone is a study by Howard Clark (1998) who analyzed Canadian experiences with formal knowledge networks. It is entitled *Formal Knowledge Networks: A Study of Canadian Experience*.

Section 1. Introduction

Solving policy problems in complex adaptive systems requires the involvement of a number of interdependent actors distributed across multiple scales, sectors, domains and levels of society, many of which are located outside governments (Kooiman, 1993, 2003). In such cases, public policy-makers and institutions find themselves "lacking the important information, knowledge and tools they need to respond to the daunting complexity of policy issues" (Reinicke & Deng, 2000, p. viii). At the same time, they are finding it increasingly difficult to involve the general public or particular stakeholders in their deliberations on critical policy problems because the increasing complexity of these issues has thwarted the common understanding and therefore the ability to reach a certain level of agreement (Reinicke & Deng, 2000, p. viii).

Sustainability is one of those complex and adaptive problems that requires the involvement of various capacities distributed across sectors and scales of organization (Kohler-Koch & Eising, 1999; Mayntz, 1998; Rhodes, 1997; Tyler, 2009). Where institutional arrangements are ill-fitted to solve complex problems (Brown, 2003; Imperial, 2001; Young, 2002), it may be necessary to use governance networks to integrate the required distributed capacities into a problem solving framework that is more reflexive, and thus more conducive to the achievement of development goals (Dietz & Ostrom, 2003; Spangenberg, 2002).

As this is being written, the world is preparing for Rio+20. The UN Secretary General's High-level Panel on Global Sustainability has recently submitted *Resilient People, Resilient Planet: A Future Worth Choosing*, a report which builds on the Brundtland Report that introduced the concept of sustainable development a quarter of a century ago (World Commission on Environment and Development (WCED), 1987). In this text, they describe sustainable development as "interconnected challenges" and "not a destination, but a dynamic process of adaptation, learning and action" (UN Secretary General, 2012). With the aim to put sustainable development into practice and to mainstream it into economic policy, they stress the importance of strengthening institutional governance, an imperative which they summarize thusly: "We must overcome the legacy of fragmented institutions established around single-issue 'silos'; deficits of both leadership and political space; lack of flexibility in adapting to new kinds of challenges and crises; and a frequent failure to anticipate and plan for both challenges and opportunities—all of which undermine both policymaking and delivery on the ground" (WCED, 1987, p. 7). Another newly released report, the first negotiating text for Rio 2012 entitled "The Future We Want," similarly describes the importance of institutional frameworks (United Nations Conference on Sustainable Development (UNCSD), 2012). We foresee that this issue of dealing with the interconnected challenges of sustainable development, in light of fragmented institutions, will lead to mounting interest in networked forms of governance leading to, and beyond, Rio+20.

As we define them in the paper, governance networks are composed of diverse participants from all scales (e.g., local, national, global) and sectors (e.g., business, government, civil society) of society, and do not merely aggregate resources, but are structured to take advantage of the fact that each participating sector brings different resources to the fore (Börzel, 1998; Creech, 2008; Goldsmith & Eggers 2004; Reinicke & Deng, 2000). Governance networks combine the voluntary energy and legitimacy of the civil society sector with the financial muscle and interest of businesses and the enforcement and rule-making power and coordination and capacity-building skills of states and international organizations (Reinicke & Deng, 2000). In contrast to state rule and competitive market regulation, governance networks involve a large number of interdependent actors who interact in order to produce public purpose (Sorensen & Torfing, 2005).

Following Creech (2008), we take the term network to comprise "a group of individuals from different institutions choosing to work together towards a common goal" (p. 3). With reference to the possible role of networks in governance, we use the term governance network

> in reference to initiatives deliberately undertaken by governments to accomplish public goals, with measurable performance goals, assigned responsibilities to each partner, and structured information flow. The ultimate goal of these efforts is to produce the maximum possible public value, greater than the sum of what each lone player could accomplish without collaboration. (Goldsmith & Eggers, 2004, p. 8)

Börzel (1998) offers a similarly attractive definition of policy networks as:

> webs of relatively stable and ongoing relationships which mobilize and pool dispersed resources so that collective (or parallel) action can be orchestrated towards the solution of a common policy. A policy network includes all actors involved in the formulation and implementation of a policy in a policy sector. They are characterized by predominantly informal interactions between public and private actors with distinctive, but interdependent interests, who strive to solve problems of collective action on a central, non-hierarchical level. (p. 260)

Creech (2008) stresses the added value that a network can have via governance outcomes, "because partners from different backgrounds can contribute complementary skills and resources to the solution of intricate problems that no organization could effectively address on its own" and "those who work in partnerships can better enrich the content of their programs, scale them up, intensify their outreach, and continue to support them far beyond what would have been possible working alone" (p. 2). However, we agree with Jones et al. (1997) in that for a network form of governance to emerge and thrive, "it must address problems of adapting, coordinating, and safeguarding exchanges more efficiently than other governance forms" (p. 917).

In this paper, we seek to identify the preconditions for successful networked governance. It is structured as follows. The next section discusses the reflexivity implications of current governance processes. Section 3 proposes the application of governance networks to some of our most complex problems, and differentiates between strategies of network management and strategies of networked governance. Section 4 discusses sustainable development as a specific problem frame that condenses the problems of current governance processes into a vision that causes interaction amongst various governance participants, some of which are located outside government. Section 5 proposes that stakeholder analysis and social network analysis can be applied to some of our most challenging problems to identify stakeholder categories, ensure key groups are included and specify representatives that are well connected and respected with the groups they need to represent (Prell et al., 2009; Reed et al., 2009), and propose optimal network structures that would maximize the ability of this group to achieve collaborative governance outcomes (Scott, 2000; Wasserman & Faust, 1994). Based on the various theories presented in Section 5, Section 6 suggests a new role for institutional brokers, as mediators of various resources, including knowledge, relationships, and policy opportunities. We discuss the frontiers of networked governance in Section 7. This is our central contribution which explains the limitations and promises of a networked governance approach, and the implications for network structures, composition and practices. Section 8 discusses the role of agency in improving the effectiveness of networked governance processes. We conclude with our final thoughts in Section 9.

The paper suggests that a combination of stakeholder analysis and social network analysis can be useful in assessing the network structure and practices that may facilitate a networked governance process. Problems of higher complexity require governance networks that are more heterogeneous. However, greater heterogeneity implies an efficacy paradox; such networks are composed of participants with more disparate worldviews, interests, motivations, relationships, power, and other resources. Network heterogeneity thereby introduces an additional level of complexity that may reduce the effectiveness of the problem solving process, and may undermine the ability of the group to work collaboratively towards desirable collective outcomes and common goals. Social capital is the fabric of trust, shared values and understanding that allows diverse participants to work together towards common goals. Problems of higher complexity requiring networks of greater heterogeneity oblige a certain level of social capital to enable effective collaborative governance.

The efficacy of a networked governance process is a factor of both problem complexity (network heterogeneity) and social capital. For problems harbouring a given level of complexity, the higher the level of social capital within an identified governance network, the more autonomy and self-organization may be conducive to achieving problem solving functions, and thus governance goals. Where social capital is incommensurate with problem complexity, it may be necessary to employ governance strategies that are more highly modulated by governance authorities situated within a centralized problem solving process. Like Fukuyama (2002), we take social capital to represent the "shared norms or values that promote social cooperation, instantiated in actual social relationships" (p. 27). Or, more elaborately, as "the stock of active connections among people: the trust, mutual understanding and shared values and behaviours that bind the members of human networks and communities and make cooperative action possible" (Cohen & Prusak, 2001, p. 4). We suggest that network architecture (the use of stakeholder analysis and social network analysis to inform optimal network structures and practices) can be useful toward understanding how to maintain or enhance social capital among participants, but is limited by prevailing agency and institutional conditions of the governance context. To this end, we discuss the roles of agency and institutional brokering.

We also discuss creating shared value as an activity that is promoted when diverse actors come together under collaborative visioning strategies. Collaborative visioning enhances common understanding, and thus may increase social capital and allow more complex problems to be addressed in the future, thereby improving the effectiveness of a networked governance approach. We distinguish between the personal visions that network actors hold before a networked governance process and the shared visions which are the outcome of collaborative visioning. Shared visions foster strategic alignment between the network actors that recognize their interdependent roles in achieving common goals and collectively desirable outcomes of sustainable development.

To safeguard social capital and to help ensure an effective process, it is important to select between strategies of networked governance strategies based on the level of self-steering or active steering that they imply. Networked governance strategies based on active steering allow centralized governance authorities to maintain a higher level of intermediate modularity, and thus greater influence over the network's various functions in and effects on policy-making, whereas strategies based on self-steering allow networks a higher level of autonomy and self-organization towards those very functions, and thus greater effect in policy-making.

Section 2. Sustainability as Requiring Reflexive Governance

Following Voss and Kemp (2006), we take governance as comprising processes by which: (1) collective problems are defined and analyzed, (2) goals and assessments of solutions are formulated, and (3) action strategies are coordinated. This conceptualization does not presuppose where such governance should be located. However, since old problem solving processes are becoming unsuitable due to the complex, adaptive characteristics of our world systems and the fact that the capacities to address governance issues are widely distributed outside traditional government (Carlsson & Sandström, 2008), it is difficult to think of reflexive governance without considering that problem solving processes should become increasingly decentralized to new governance spaces comprised of a multiplicity of actors from all sectors of society.

Using Beck's theory of reflexive modernization (Beck, 1994; Beck, Bonss, & Lau, 2003), Voss & Kemp (2006) identify two problems with the current governance processes. First, patterns of governance undermine themselves by inducing changes in the world that then affect their own working (first-order reflexivity). Second, because governance capacities for sustainable development are increasingly widely distributed outside of government, it is only by reconstructing governance patterns that governance processes may be conducive to sustained societal development (second-order reflexivity). Regarding current processes, Voss and Kemp (2006) state that:

> . . . it was possible to achieve tremendous technological developments, sophisticated patterns of social regulation and high economic efficiency of production. The trick [was] simple: to decide and act rationally, one need[ed] to isolate discrete dimensions of complex reality . . . establish priority of goals and assign responsibilities . . . The approach to problem solving yielded power because it allowed the construction of a multitude of specialized perspectives, enabling more precise targeting of purposes, concentration of action capacities and control over processes within the systems boundaries thus defined... this kind of problem solving leads relentlessly to unintended consequences . . . (p.5)

In this view, current governance approaches, by specialization, have become disengaged from the complex, interconnected reality of sustainable development. Operating within their individual departments, specialized problem solving creates externalities (or negative side effects, from the problem solver's own perspective) that create additional problems for departments working within their own specialties. These externalities become second-order problems (Jahn & Wehling, 1998) which must then be addressed by setting aside specialized problem solving. According to Voss and Kemp (2006), important issues of sustainable development manifest as negative byproducts of inadequate governance processes.

Reflexive governance suggests that interdependencies must be confronted in the early stages of problem solving. But, given the complex context and dynamics of problem solving, it is necessary that governance processes be *opened up for interaction with distributed capacities to address the important challenges, with a wide variety of actors across society*. To this end, Voss, Kemp, and Bauknecht (2006) propose that conventional governance processes should be opened-up for interaction with their context and develop capacity for mutual adaptation of strategy and context before damage is done so that factors that had before then been externalized become incorporated in problem definition and strategies. As such, externalities (unintended feedback) would be reframed as productive interaction with dynamic contexts of real world implementation, and it would be possible to retain the powers of specialization while accepting that problem solving and its dynamics are embedded in complex contexts.

Integrative solutions to sustainable development would thus require the application of an additional layer of integrative, unrestrained and open-ended governance that would enhance existing processes by reflecting, orienting and supervising specialized problem solving. This enhanced form of governance—by establishing links and organizing problem-oriented interactions across distributed capacities and steering activities—would engage in the modulation of ongoing societal developments (Rip, 1998). According to this view, societal development is not steered from a single point (governments), but from the interaction of state actors and interest groups, producers and consumers, scientists, the media, and many others (Geels, 2002, 2004). It stands in stark contrast to the technocratic approach.

Opening up can take place at all three stages of problem solving (Voss et al., 2006): (1) at the problem analysis stage, by extending system boundaries and increasing the range and diversity of factors and interactions considered in analyzing problem causes, dynamics and effects of interventions; (2) at the goal formulation stage by revising given targets by taking into account the broader spectrum of values and facing trade-offs that have to be made, and; (3) at the strategy development and implementation stage by widening the range of measures and options that are considered and implemented for problem handling. Reflexive strategies used to open up problem solving include (1) integrated knowledge production, (2) strategy experimentation and adaptivity, (3) anticipation of long-term effects, (4) interactive and participatory goal formulation, (5) interactive strategy implementation, and (6) congruency between governance and problem spaces (Voss et al., 2006): By opening up governance processes to distributed capacities as such, concerns for more complex interactions lead to a learning-oriented approach towards societal steering, to a more reflexive form of governance (we discuss learning in Sections 4 and 7).

Implicit in this new approach to governance, however, is an efficacy paradox. Opening-up is necessary to take account of the complexity of sustainable development challenges, but the very act of opening-up makes the task of problem solving more complicated: what were once externalities became complex interdependencies and trade-offs that are now explicitly considered and negotiated, and the interests of actors from different realms of society need to be addressed within the problem solving process, rather than closing them out. So the very act of opening-up introduces its own complexities as it implies opportunistic behaviour and power struggles no less than it includes collective problem handling, dialogue and cooperation. As such, closing-down is necessary to reduce the complexity of problem solving and retain the ability to act (Rip, 2006). As suggested by Voss et al. (2006), the efficacy paradox therefore implies that reflexive governance is a matter of pursuing both—opening up and closing down—in order to enable the incorporation of uncertainty, ambivalence and distributed capacity and control, while retaining the ability to make decisions and take action. We consider the implications for networked governance strategies in the following section.

Section 3. Networked Governance: Integrating distributed capacities to solve complex problems

Solving complex problems requires the integration of capacities distributed across scales, sectors, domains and levels of social organization and governance systems. As such, reflexive modernization leaves us with this ultimate question: what governance structures and practices (patterns) are best suited to take advantage of the capacities for problem solving that are distributed outside centralized governance agencies? We suggest that using governance networks in a networked governance framework may be useful to that end.

Governance networks do not merely aggregate resources, but are structured to take advantage of the fact that each participating sector brings different resources to the fore; they combines the voluntary energy and legitimacy of the civil-society sector with the financial muscle and interest of businesses and the enforcement and rule-making power and coordination and capacity–building skills of states and international organizations (Börzel, 1998; Creech, 2008; Goldsmith & Eggers 2004; Reinicke & Deng, 2000). These networks create bridges that enable various participants to exploit the synergies between the resources that they contribute, allowing for the pooling of knowledge, the exchange of experience, and for the generation of a feasible institutional framework for fruitful collaboration. Because they span socioeconomic, political, and cultural differences, networks can transform what might otherwise degenerate into counterproductive confrontations across public, private and civil society sectors into constructive, collaborative relationships (Reinicke & Deng, 2000). Networks, partnerships and inter-organizational collaborations are defined in this context. Governance networks allow part of societal steering and problem solving to be accomplished by a wide variety of actors that agree to create problem solving spaces outside the government, to address all or some of the stages of strategy formation: (1) problem analysis (2) goal formulation stage, and (3) strategy development and implementation.

Schout and Jordan (2003, p. 9) distinguish between two models of governance networks: one involving active steering by governments or other centralized governance authorities, and one that focuses on governance networks as self-organizing systems. Currently, the dominant model has been that of active steering, but self-organization, which allows the delegation of some governance tasks to "networks of self-regulated actors who negotiate their own collective coordination agreements" (Dedeurwaerdere, 2005, p. 2) is being considered in certain jurisdictions (see, for example, the European Commission's *White Paper on Governance*; Commission of the European Communities (CEC), 2001). Active steering of governance networks allows for centralized governance authorities to maintain a higher level of intermediate modularity (see Section 5 for an explanation of "intermediate modularity"), and thus a greater ability to close down and open up processes at will. Governance networks as self-steering allow for the decentralization of governance processes wherein a variety of actors may interact with a certain level of autonomy and self-organization towards the achievement of problem solving functions, and thus governance goals. Thus strategies to achieve networked governance can be placed on a continuum based on the level of autonomy and self-organization that is being delegated to a governance network in terms of achieving organizing functions and governance goals—see Figure 1.

Networked governance strategies based on active-steering are those by which governments or other centralized governance authorities can put in place mechanisms and organizational structures that allow outside agents and organizations to self-organize, within certain boundaries, to inform centralized problem solving. With these approaches, strategy formulation processes are centralized within governments or other governance authorities, but outside actors are allowed and encouraged to self-organize within governance networks, to influence or inform all

or some of the stages of the problem solving process.[1] On one end of the continuum, networked governance makes extensive use of global policy networks (e.g., Reinecke & Deng, 2000) and knowledge networks (e.g., Clark, 1998; Kurtz & Snowden, 2007; Stone & Maxwell, 2005) to incorporate these distributed capacities (see Appendix 1). The strategy by which these capacities are incorporated into centralized problem solving processes is called network management.

Approaches such as adaptive policy-making (Swanson & Bhadwal, 2009) and transition management (Rotmans et al., 2000) make extensive use of network management as well but encourage greater influence of governance network participants over organizing functions and governance outcomes, and thus can be seen as a hybrid between active steering and self-steering. These approaches allow centralized governance authorities to maintain control over opening-up and closing-down of the process of strategy formation—centralized authorities retain a high level of intermediate modularity—but aims to stimulate the influence of outside actors that may self-organize within the boundaries of the governance network. We describe these two hybrid approaches below. However, being centralized within governments, which have limited reflexive capacities, we note here that these strategies may only provide part of the solution by which governance processes can sufficiently reflect, orient and supervise specialized problem solving. These approaches are instrumental, however, to creating shared value, and thus should be preferred via many governance issues (this point is discussed further in Section 7).

Adaptive governance, by making use of extensive multistakeholder deliberations (via network management), seeks for more integrative and adaptive approaches to problem solving in order to make resulting policies (formulated governance strategies) more resilient to complex adaptive external conditions. Transition management attempts to use multistakeholder deliberations within a "transition arena" as a tailor-made problem solving space wherein "different perspectives, different expectations and different agendas are confronted, discussed and aligned, where possible" (Voss, Kemp, & Bauknecht, 2006, p. 428). What is different between this arena and the reflexive layer proposed by adaptive management is the orientation and
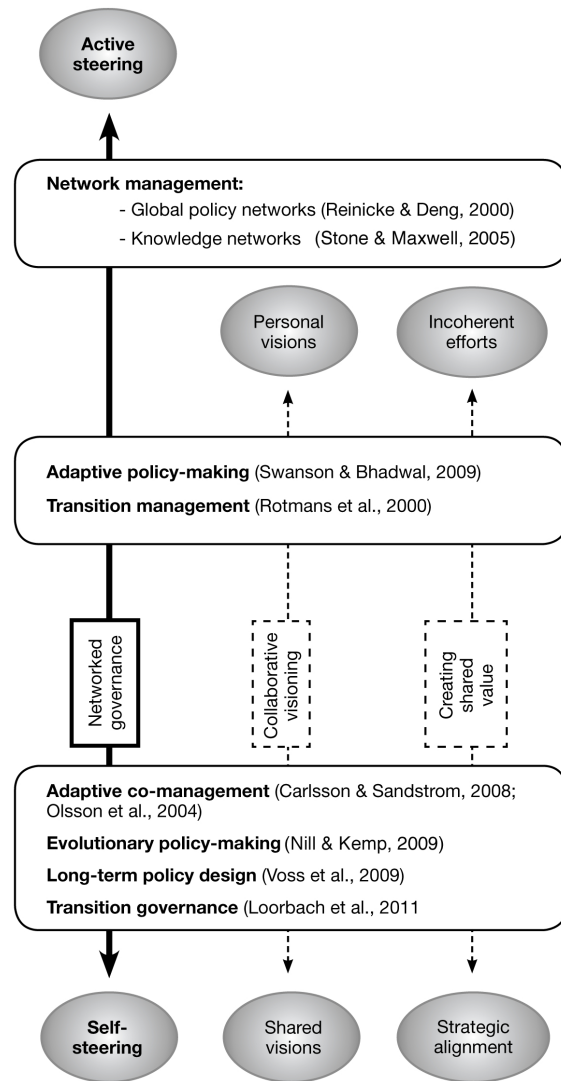

Figure 1. Networked governance continuum with two parallel and intertwined processes.
Approaches to networked governance are placed on a continuum based on the level of active-steering (or self-steering) that they imply from centralized governance authorities. Collaborative visioning and creating shared values are depicted as two parallel and intertwined processes. Collaborative visioning is a process of fostering shared visions of sustainable development for the system which is the object of policy. This process enhances learning between network actors, and may result in strategic alignment towards common goals and collective outcomes, and thus enhance the ability of the network to create shared value.

[1] Stages of problem solving: (1) problem analysis stage, (2) goal formulation stage, and (3) strategy development and implementation stage.

goals of the interactions. Whereas policy-makers attempt to open up their governance processes to make governance solutions more resilient (adaptive) to change by employing adaptive governance strategies, the "transition arena" is used as a platform for a multitude of actors to contribute to the steering of societal development, both with regards to actively influencing and supporting the emergence of more sustainable niche patterns of societal structures and practices—i.e., to move society to a more sustainable system state—and also with regards to informing governments on the formulation of systemic steering strategies.

Networked governance strategies based on self-steering seek to move certain problem solving responsibilities and intermediate modularity roles to actors distributed outside governments in recognition of the limited reflexive capacities of centralized problem solving processes (Benner, Reinecke, & Witte, 2004; Dedeurwaerdere, 2005; Reinicke & Deng, 2000), and involve a large number of interdependent actors who interact in order to produce public purpose (Sorensen & Torfing, 2005). As emphasized by Folke et al. (2007), the power and responsibilities of centralized agencies should be partly redistributed, not eliminated, and balanced to local-level institutions to enable self-steering. As such, one can regard power sharing as the result rather than the starting point of integrating distributed capacities for governance (Carlsson & Berkes, 2005). Based on self-steering, the process by which governance strategies are formulated is not located outside the target system but embedded within the social and political processes it seeks to influence (Stone, 1988), and deeply intertwined with the implementation process. Voss et al. (2009) describe the approach as one of "long-term policy design", while Nill and Kemp (2009) describe it as "evolutionary policy." The process relies on testing strategy formulations in practice, continuously reflecting on implementation experiences, and adjusting governance strategies in response to these (Majone & Wildavsky 1978; Pierson 1993). Loorbach's concept of transition governance (Loorbach et al., 2011) in which governance is a meta-level (regime-level) pattern of social interactions that "emerges from the governing of social, political and administrative actors" (Kooiman, 2003, p. 7) is also based on networked governance as self-steering. Similarly, the adaptive co-management of natural resources (e.g., Carlsson & Sandström, 2008; Olsson, Folke, & Hahn, 2004) can also be positioned towards the self-steering end of the networked governance continuum because the approach engages and empowers local communities in the governance process, wherein it is proposed that actors across all sectors of society (the private, public and civil society sectors) have the capacities to effectively self-organize to achieve organizing functions and governance goals.

It is not the object of this paper to discuss the various approaches to networked governance in great length, nor do we believe that a thorough discussion would benefit our central contribution. For the purpose of our analysis, it suffices to describe these approaches as differing in their position on a networked governance continuum that distinguishes these approaches in terms of the level of autonomy, self-organization and intermediate modularity properties that characterize the network's operation and role in achieving the various functions of governance. It is also helpful to portray, along this continuum, the role of two parallel and intertwined processes that make up a networked governance process: collaborative visioning and creating shared value. In Sections 4 and 7, we describe these processes as being instrumental to maintaining and enhancing social capital, and thus, essential to effective networked governance. Our discussion of network theory in Section 5 highlights the influence of network structure and practices on social capital: in selecting from a portfolio of possible networked governance strategies, it may be helpful to use stakeholder analysis and social network analysis to identify the network structures and practices that may help foster social capital. The level social capital within a given governance network, and the success of collaborative visioning in instilling shared visions and strategic alignment towards common goals and collective outcomes, determines the amount of self-steering that may be possible and desirable within networked governance, and the possibility for the multi-actor network to create shared value.

Section 4. Sustainable Development as Problem Framing and the Role of Visioning

Sustainable development, which incorporates concerns for complex interactions, unanticipated conditions and path dependency into our problem solving processes, calls for a fundamental reorientation of governance: the need to reframe externalities (negative side effects) from modernist problem solving methods, into trade-offs that must explicitly be addressed and negotiated by the multiplicity of societal actors, which lie mostly outside of government. As such, sustainable development "provides a normative frame of reference to discuss and direct differences in perception, ambition and understanding between actors in light of desired changes in society" (Loorbach et al., 2011, p. 76). Similarly, Voss et al. (2006), describe sustainable development as "the *chiffre* [sic] under which the structural changes that are sociologically conceptualized as reflexive modernization become politically negotiated . . . it works as a change agent, a vehicle and a mediator for governance changes towards reflexive governance" (p. 422). In this sense, sustainable development can be seen as condensing the problem of negative side effects of modern problem solving into "a slogan that triggers communication across different domains and levels of social action" (Voss et al., 2006, p. 423). Whereas sustainable development provides the framing of the governance problem, networked governance provides a solving process for reflexive governance.

Based on the notion that each of the actors involved has only a limited view of the whole and restricted capacity to influence outcomes (Smith & Stirling, 2007), effective networked governance requires learning by and between policy-makers, policy co-producers and stakeholders (Grin & van de Graaf, 1996). Networked governance organizes processes of interactive learning (Bobrow & Dryzek 1987; Schneider and Ingram 1997) in which actors learn from each other and may build individual participants' systems intelligence through second-order learning.[2] During the evolutionary process, shared problem solving frameworks are formed by going from abstract theoretical notions of the problem frame to concrete constellations in policy fields, and backward again between problem definitions and assessments of policy solutions (Voss et al., 2009)—continuously testing concepts that could accommodate the views of the diverse participants whose support is needed to make the policy work (Kemp & Rotmans, 2009; Smith & Kern, 2009), while anticipating interpretations, structures and activities of network participants (Bardach, 1977; Kingdon, 2003). Voss et al. (2009, p. 279) describe the approach as "an interactive process of constructing and shaping political reality (Stone, 1988; Schneider and Ingram, 1990, 1993, 1997)" that "tries to turn the messiness of bottom-up implementation into a productive dynamic (Wildavsky, 1988)."

Collaborative visioning and vision sharing is seen by organizational scholars as a crucial foundation for proactive learning because it provides direction and a sense of commitment and purpose among members (Day, 1994). Shared visions enable participants' understanding of each other's' expectations, what outcomes to measure and what theories are in application. Visioning is undertaken with the goal of identifying attractive system innovations and the commitment for collaborative governance. At the onset of a networked governance process, participants with diverse worldviews, motivations, interests, motivations, relationships, power, and other resources often hold disparate visions of what is possible or desirable from their individual standpoint. Like Senge (1990) we differentiate between these personal visions, which some participants hold before a networked governance process, and shared visions, which is the aim of collaborative visioning. By fostering these shared visions of sustainability, it is possible to create shared value.

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[2] Second-order learning is also referred to as double-loop learning by Argyris (1977) and generative learning by Senge (1990).

Creating shared value is achieved when network actors align their individual strategies according to shared visions of sustainable development. Sustainable development can be described as encompassing aspirations of collective good and common goals that may be achieved when diverse but interdependent network actors engage in coherent efforts to achieve public outcomes that would be impossible if each actor operated on their own. Networked governance can therefore also be described as a process of creating shared value through strategic alignment. Like Senge (1990), we stress the importance of strategic alignment in network learning and innovation, crucial components of reflexive governance for sustainable development. Shared visions and strategic alignment foster social capital in governance networks.

Section 5. Applying Social Network Analysis

Very complex problems require a certain (higher) level of social capital among distributed participants to make possible a networked form of governance (Burt, 2000; Borgatti, Jones, & Everett, 1998). The key for networked governance effectiveness is social capital: if the actors that collectively harbour the capacities for distributed governance can be integrated and structured in a manner that fosters sufficient social capital, then networked governance may be possible. In this section we consider four key network features (centrality, density, nature and strength of ties, and leadership) that are important for social capital and, thus, effective networked governance. These features have different performance implications for various levels of problem complexity and network heterogeneity; the more complex a problem, the more distributed are the capacities required for problem solving, requiring a more heterogeneous network: accordingly, the more (less) heterogeneous is a network, the more (less) prominent are certain network features over others to achieve performance goals. We discuss these network features below.

By definition, heterogeneous networks are comprised of participants with dissimilar resources, spanning various scales, levels and domains of organization. These resources include various forms and types of knowledge, leadership, connections, power and influence, etc. Accordingly, participants in such networks also harbour differing worldviews (lifestyles, values, ethics, etc.), information asymmetries, methods of communication, motivations and so on. Heterogeneity thus poses a challenge for collaboration. The more complex the problem, the more distributed are the capacities for effective governance, and the more difficult is collaboration under a networked governance approach.

The achievement of networked governance goals is closely related to the collective ability of participants to perform various organizing functions such as problem definition, resource mobilization, prioritizing and evaluation, and the coordination of these (Carlsson & Sandström, 2008). However, the more a problem is complex and interconnected across various scales and domains—and thus requires the integration of a more diverse and heterogeneous group of participants—the more difficult it becomes to achieve such organizing functions. Since networks, as opposed to hierarchical arrangements, are self-organizing, achieving such organizing functions is largely dependent upon the agency characteristics of participants and the network (organizational) structure through which they interact towards the production of governance outcomes.

Studies have shown that a combination of stakeholder analysis and social network analysis (SNA) can help identify stakeholder categories, ensure key groups are included and specify representatives that are well connected and respected with the groups they need to represent (Prell et al., 2009; Reed et al., 2009) within a networked governance approach. SNA, which explains the performance implications of various network structures and agency characteristics, can be especially useful in addressing the efficacy paradox implied by integrated, multistakeholder governance processes (Scott, 2000; Wasserman & Faust, 1994).[3] Network features such as centralization, density, the nature and strength of relationships, and leadership are key elements to foster social capital within the network and the collective ability to perform networked governance functions.

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[3] However, acknowledging the weight of the paradox, we emphasize here that a network approach to governance requires a certain level of social capital, and that SNA, although useful in advancing such capital, is limited by prevailing conditions of the social system in which practices and structures (patterns) of social organization are embedded. Networked governance, although required for complex sustainable development problems, cannot be used effectively when stakeholders harbouring the necessary capacities cannot organize successfully under any network structure to produce the required governance outcomes.

Centralization

A highly centralized network will have many of its links (relationships) shared among only a few high-ranking nodes (participants), while a decentralized structure would have little variation between the number of links shared by every node. Mathematically, centralization is the difference between the number of links (relationships) for each node (participant) divided by the maximum number of sum differences of links per node. There are two main types of centrality. *Betweenness centrality* is the number of times that an actor connects two nodes which would otherwise be unconnected. This actor brings diversity and new ideas to a network, but might feel torn between different elements and might feel forced to take sides (Krackhardt, 1992). *Degree centrality* is simply the number of times a given actor is connected to other nodes. High degree centrality actors are important to mobilize the network, bring diverse stakeholders together and diffuse information. However, their ties are often weak and thus easily breakable and may lack direct, significant influence. Highly centralized networks are dependent upon the existence of a few hubs (leaders), for, if these were removed, the network would likely dissolve into small and disconnected groups (Albert, Jeong, & Barabasi, 2000). Thus, unless mechanisms are in place to make these nodes (high-ranking positions) easily replaceable, centralized networks are less resilient (adaptive) to change (Olsson & Folke, 2001). Moreover, because high-ranking nodes (degree centrality) must dispense a high amount of energy (resource) to maintain such a large number of relationships, ties are often weak and therefore easily breakable.

Research has shown that the combined effect of centrality and formal level of authority coincides with perceived level of influence in decision processes (King, 2000). However, because their ties are weak, highly connected nodes cannot always be expected to exercise direct, significant influence on the actions of other participants, especially in the absence of formal authority. Sandström (2004) has shown that a high degree of network centralization is positively related with collective action in resource governance because high-ranking nodes thus facilitated certain organizing functions such as prioritizing and coordination; in a centralized network, relevant information can be relayed and synthesized to a few actors who can make decisions and take action (Leavitt, 1951). However, because of the uneven distribution of ties and the consequent asymmetric relations of influence and power, highly centralized network structures raise issues of legitimacy and accurate representation of peripheral actors (Ernstson, Sorlin, & Elmqvist, 2009; Diani, 2003). Centralized decision making also has a negative effect on collective learning because the high-ranking nodes can reduce the access of individual actors to multiple sources of information (Abrahamson & Rosenkopf, 1997; Weimann, 1982).

Different phases of the governance process might require different degrees of network centralization (Bodin, Crona, & Ernstson, 2006). In the early phases of a process, it might be beneficial to have a highly centralized network as to facilitate the mobilization and coordination of actors (Crona & Bodin, 2006; Olsson, Folke, & Berkes, 2004), while the later phases of complex problem solving might require engaging a larger diversity of actors into a less decentralized structure so as to allow greater distributed capacities to be integrated into the governance process: long-term planning and problem-solving towards complex long-term goals might require a more decentralized structure with more ties— both weak and strong—and more actors and stakeholder categories (Crona & Bodin, 2006). In general, the positive effect of centralization decreases as the level of complexity increases (Jones, Hesterly, & Borgatti, 1997; Brown & Miller, 2000).

Density

Network density is a measure of the integration of nodes. It is the proportion of actual links in a network relative to the total number of possible links, the extent of network integration, and the degree to which network participants are linked to each other. High density may contribute to the strengthening of trust between participants and between various groups within the network, thereby reducing the risk and cost of collaboration and promoting the development of (and compliance with) governance norms in relation to what is considered acceptable societal behaviour (Granovetter, 1985). As such, density is positively correlated with participants' ability to achieve collective action (Coleman, 1990) and organizing functions of prioritizing and network effectiveness (Provan & Milward, 1995; Sandström, 2004). Since they are well integrated, participants gain a collective ability to make decisions and solve conflicts more efficiently. However, because information within the network is typically spread profusely, high density can result in the homogenization of knowledge and experience, wherein participants will tend to adopt similar problem perceptions (Weimann, 1982). Therefore integrated networks are at a higher risk of groupthink and lock-in. Governance solutions produced from such homogeneous networks can be maladaptive.

Nature and Strength of Relationships

Theory suggests that well-performing adaptive co-management networks are characterized by a heterogeneous set of actors that are centrally and densely integrated (Carlsson & Sandström, 2008). Such networks require high betweenness centrality so that internally dense groups are well connected across sub-sets by in-group members who can modulate processes across other groups with which they have a certain level of integration. As such, betweenness allows the formation and integration of various subgroups with internal trust and with some degree of trust among them, linked together by motivated, well-connected, high-ranking nodes (brokers) who are interested in using their position to advance and maintain various governance processes (Freeman, 1979). This *intermediate modularity* allows different groups to develop partly distinct knowledge and perceptions of the problem at hand, which can then be conveyed across to other groups within the network (Crona & Bodin 2006; Webb & Levin, 2005). Such a network structure thus allows for a richer understanding of the governance problem and therefore a potentially more complete problem solving approach.

Harbouring distinct problem knowledge and perceptions, densely integrated, diverse subgroups can enhance the self-monitoring function of the networked governance process. However, if the network is too highly centralized across high-ranking nodes, then subgroups may become at risk of exacerbating internal conflicts and an "us-versus-them" mentality (Borgatti & Foster 2003). This possible negative development would limit the network's collective ability to seek and achieve consensus. Therefore, for this modular network structure to be effective, a certain level of social capital in such forms as trust and understanding among and across subgroups is necessary.

In social network analysis, the measurement of betweenness centrality is used to identify individual participants that occupy a bridging position. As stated earlier, these individual brokers link groups that would otherwise be isolated (Freeman, 1979; Gould & Fernandez, 1989), learning about the inner dynamics of the different groups, and thus gaining the knowledge of which individuals or subgroups to connect (or not to connect) and how or when to connect them (Bodin et al., 2006). Burt (2003) calls this capacity "adaptive implementation" since it allows the network to more easily navigate complex governance processes while being subject to continuously changing internal and external conditions. Although we have referred to brokers as individual actors, they often act in a representative capacity for their organization (also see institutional brokers, Section 6), but not exclusively so.

In-group members harbour strong ties, a higher level of trust and tend to have similar worldviews. For this reason they are better able to communicate complex information and tasks, transfer tacit knowledge, engage in mutual learning, and share resources and advice among themselves (Granovetter, 1973). Their strong ties favour collaborative action and restrain opportunistic behavior (Granovetter, 1973) at the local-level, but also at a global structural level assuming that all groups are well integrated via high-ranking nodes. Diverse groups that are densely integrated will have a certain level of heterogeneity introduced by brokers (or bridging actors) who can communicate information from diverse outside actors and bring differing perceptions into discussion, thereby allowing the power of specialized problem solving processes to effectively operate under internal and external conditions of complex adaptive systems (e.g., Moller et al., 2004; Walters, 2006). Bridging ties (brokers) provide access to external resources and are often needed to help network actors initiate or support collective action (e.g., Granovetter, 1973; Newman & Dale, 2007; Lin, 2002). In SNA terms, they can function as hubs that disseminate resources like information and advice to diverse network participants. They can also foster trust and other forms of social capital among groups, building a common vision, shared goals, forestalling conflicts, and so on.

Leadership

Leadership comes in many forms and with many functions. It provides a source of social capital that facilitates social organization towards networked governance. Bridging organizations and individuals, brokers, high-ranking nodes, thought leaders, stewards, institutional and policy entrepreneurs, are all synonymous with leadership in networks. Leaders are the well-connected nodes (unique structural position) that actively make possible effective and efficient networked governance; using their structural position between diverse groups to learn about varying dynamics and orchestrate the transfer of information, knowledge, tasks, processes and so on; they provide the coherent narrative and collective vision that modulates social organization (e.g., Waltner-Toews et al., 2003; Westley, 1995), create new understandings, make sense of governance problems, see new opportunities not recognized by others, maintain dialogue with key actors, identify interests, build trust, facilitate collaboration, forestall conflicts, etc. (e.g., Olsson, Folke, & Hahn, 2004; Folke, Colding, & Berkes, 2003; Bass, 1990). These nodes carry the network's capacity to adapt to the interactive dynamics of internal and external conditions (Westley, 2002), and to balance network organizational patterns as to mitigate the substantial paradoxes of networked governance (e.g., Bodin & Norberg, 2005), facilitating vertical and horizontal links towards various organizing functions (Folke et al., 2003; Olsson, Folke, & Berkes, 2004). Using case study methodology, Folke et al. (2003) identified the following leadership groups in governance networks: knowledge retainers, interpreters, facilitators, visionaries, inspirers, innovators, experimenters, followers, and reinforcers. Entrepreneurial leaders have also been shown to be a significant force in the development of international institutions by functioning as agenda setters, popularizing issues, devising policy options to overcome bargaining impediments, brokering deals, and lining-up support for salient options (Young, 1991).

The evolution of a network has been described as an outcome of purposive action taken by self-interested individuals who are motivated to maintain or procure resources of various kinds, including money, knowledge and legitimacy (Hanf & Scharpf, 1978). Whereas heterophilous interactions (i.e., exchange among actors with heterogeneous resources) require a greater effort (i.e., more investment in resources), they are also expected to yield greater benefits for the actor (Lin, 2002). In this sense, networks can be described as a bargaining game that arises from a state of resource dependency between participants, whereby they negotiate and adapt to the strategies of others within the network (Thatcher, 1998). As such, leadership may entail the motivation of participants towards desirable action. Leadership requires not only a high-ranking network position, but also the individual incentives to invest time and resources into their important roles as modulators. A lack of leaders can lead to inertia (Scheffer, Westley, & Brock, 2003).

Section 6. Institutional Brokering

Heterogeneous networks are composed of subgroups that are highly diverse from one another, and therefore require a higher level of intermediate modularity from those high-ranking nodes that are well connected and respected with the groups they need to represent. Social network analysis and stakeholder analysis can be used to identify the key network features of centralization, density, the nature and strength of relationships, and leadership which are key indicators of this ability of the network to bridge various subgroups. Where subgroups are inadequately bridged, underrepresented stakeholders may be inadequately reflected during the policy-making process, leading to suboptimal policy innovations. Alternatively, due to lack of bridging, tackling complex problems, can subject participants to erosion of social capital as diverse subgroups that are inadequately modulated experience discrepancies in conceptualizations, conflicts, opportunism, power struggles, etc. In network terms, the absence or lack of bridges is called a structural hole. Structural holes are detrimental to collaborative processes for several reasons such as those mentioned above and elsewhere in the paper. Bridging these holes, on the other hand, can lead to superior policy innovations and, in other ways, benefits from a networked governance process that is true to its intended form. The risks of employing a collaborative process where there is inadequate bridging includes the possibility that the process is "hijacked" by dominant stakeholder groups, that policy-making leads to inadequate solutions, and that the benefits associated with the networked governance process do not outweigh the costs (financial, social and otherwise). Effective networked governance of highly complex problems such as sustainable development is thus dependent upon actors harbouring sufficient capacity to perform a certain level of brokering (e.g., Folke et al., 2005).

Institutional brokering is a network function that creates bridges across various groups. It brokers not only an appropriate flow and control of information, but also takes into account the various group dynamics such as motivations, resources asymmetries and worldviews in order to build trust, forestall conflicts, facilitate collaboration, identify opportunities, etc. In networked governance, such brokering has been shown to reduce the transaction costs of collaboration by providing incentives for stakeholders to invest in building trust, identify common interests and resolve conflicts (Hahn et al., 2006). These bridging nodes perform a role much larger than that of knowledge brokering; filling the gaps in network structures across highly diverse groups, they must sufficiently modulate patterns of organization to make possible a networked form of governance (e.g., Alcorn et al., 2003; Wilson et al., 2006).

It is important to study prevalent network structures that link the stakeholders groups that are deemed important to the networked governance process. Where there is a lack of actors that are well connected and respected with the groups they need to represent, strategies should consider bridging methods that may address the existing structural holes. In this process, it may be useful to identify the asymmetries that characterize the high-ranking nodes across the diverse stakeholder groups. Networked governance strategies may consider mechanisms to bridge these asymmetries prior to key steps within the networked governance process such that social capital may be improved sufficiently with this brokering in lock-step with the demands of various collaborative processes and levels of problem complexity. In the absence of incentives for such bridging leadership within the governance network, strategies may consider methods to instill such incentives within the network, or alternatively, take a proactive role in creating these bridges as with the case of the role of the Ekomuseum Kristianstads Vattenrike in the Kristianstads Vattenrike Biosphere Reserve, which we discuss briefly in the next section.

The high-ranking nodes which are in charge of such modularity have a high level of influence over the way in which networked governance processes and organizing functions will be managed. The more complex is the policy problem or problem solving framework, the more dependent networked governance becomes, for its efficacy, on the manifestation of these high-ranking nodes as adept intermediate modulators. Absent the necessary process management capabilities, social capital may degrade and prevent the achievement of innovative solutions.

It is important to note that governance networks do not replace the accountability of existing hierarchical bureaucracies but operate within and complement them (e.g., Kettle, 2000). However, such network structures partly rely on polycentric institutional arrangements that are nested, quasi-autonomous decision-making units operating across multiple scales (Ostrom, 1996; McGinnis, 1999), and institutions across these scales must be flexible enough to deal with the ambiguity of multiple objectives (Shannon & Antypas, 1997). Spanning across scales, the governance network provides a balance between decentralized and centralized control (Imperial, 1999): institutional brokering allows this balance.

Section 7. The Frontiers of Networked Governance

Where problem complexity determines the required level of network heterogeneity (see Section 5), and where social capital determines the effectiveness of a networked governance process, the efficacy of a networked governance approach is a direct function of both: the heterogeneity of the governance network (as determined by the complexity of the problem) and the social capital within the network (as determined by the agency characteristics and organizational structure of the network). Figure 2 depicts the curvilinear relationship. We describe efficacy as curvilinear because it is thought that problem complexity subjects effectiveness to increasing marginal requirements of social capital. As stated elsewhere in this paper, sustainable development requires the confrontation of complex interdependencies and trade-offs that affect the interests of actors from different realms of society: the more complex these interdependencies, the higher the marginal social capital requirements for an effective networked governance process.

Social capital is a relation of trust, reciprocity, common rules, norms, sanctions and connectedness in institutions (Pretty & Ward, 2001), and has been described as the glue for collaborative governance processes (Adger, 2003). For example, organization management literature has shown that social capital improves participants' capacity to create innovative solutions (Moran, 2005), and to engage in constructive processes of communication, social integration and coordination among functionally diverse groups (Evans & Carson, 2005). In adaptive co-management studies, social capital has been shown to be related to the capacity of teams to process information, make sense of scientific data and connect it to an empirical context, thereby allowing the mobilization of social memory from past experiences and facilitating adaptive and innovative responses (Tompkins & Adger, 2004; Newman & Dale, 2005).

Social network analysis, which looks beyond the attributes of individuals to examine relationships between them, how they are positioned with respect to each other into an overall pattern of social organization, is a useful tool to asses and improve social capital (Scott, 2000; Wasserman & Faust, 1994); by configuring or reconfiguring patterns of organization, bridging structural holes, encouraging leadership and so forth, it is possible to optimize network structures and patterns of organization, and thus the effectiveness of a networked governance process. The efficacy frontier depicted in Figure 2 assumes that network participants interact within this optimal network structure given actual conditions shaping social organization, including prevalent institutional frameworks.

Employing a networked governance process where social capital is insufficient to address the complexity of a given problem (wherein problem complexity lies above the efficacy frontier: Point "A"; PC1, SC1) may cause further erosion of social capital: it can cause entrenchment, conflicts between parties, create discrepancies in conceptualizations, and otherwise raise barriers to collaboration (i.e., Kendrick, 2003). For example, Scheffer et al. (2003) described how credible authorities who neglect the problem solving process may cause opinion shifts across network participants. Baland and Platteau (1996) described how the negligence and loss of trust among network members can jeopardize collaborative governance processes. Rather than engaging in collaborative processes across the heterogeneous network of actors which fall short of the social capital threshold frontier for collaborative visioning, it may be more beneficial for centralized governance authorities to use network management strategies and support various global policy networks and knowledge networks which may self-organize, within bounds, to inform centralized governance processes. Reinecke and Deng (2000), for example, describe several effective networks such as the World Commission on Dams (http://www.unep.org/dams/WCD/), the Consultative Group on International Agricultural Research (http://www.cgiar.org/), the Urban Management Programme (http://www.unhabitat.org/categories.asp?catid=374) and others.
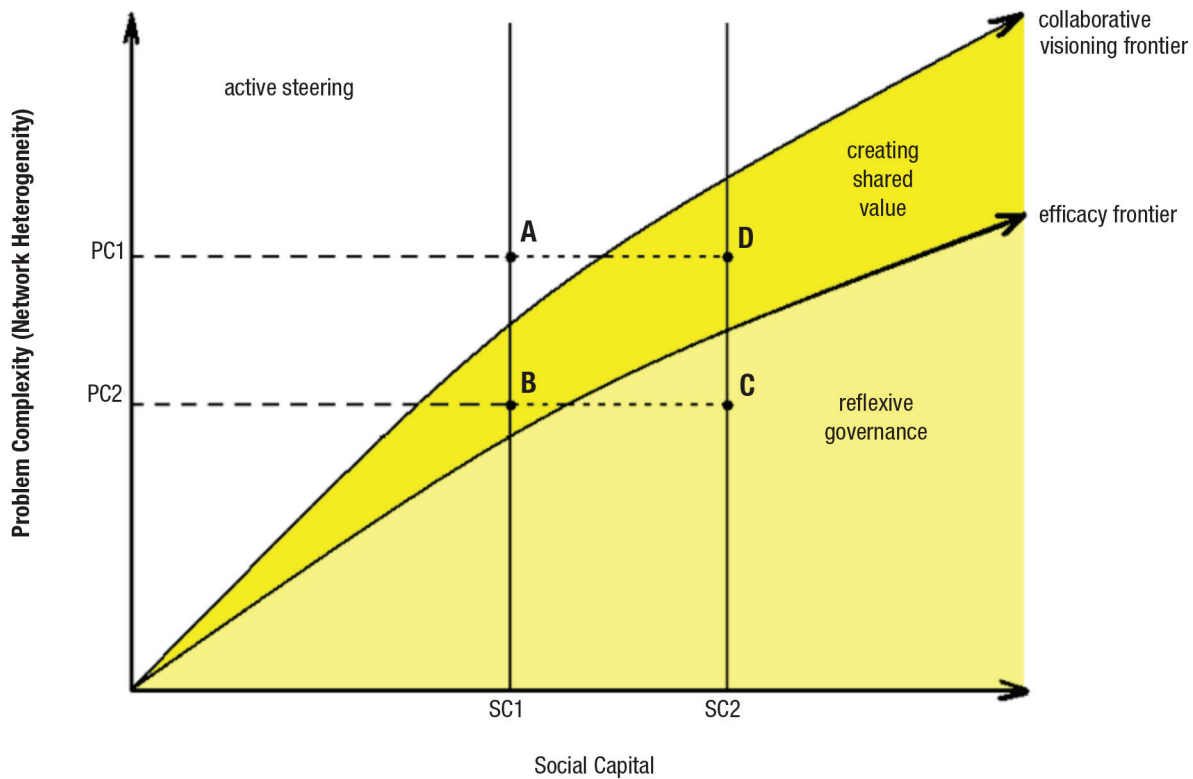
Figure 2. Frontiers of networked governance. (A) Represents a problem for which insufficient social capital implies the inefficacy of collaborative processes. Here it is better to rely on network management (policy and knowledge networks) to inform active steering and centralized problem solving. (B) Presents a problem for which social capital implies the possibility of creating shared value. It may be useful to employ collaborative visioning processes to inform strategies such as adaptive governance and transition management, which are mixed hybrid models between active steering and self-steering approaches, as they are highly modulated by centralized governance authorities. These processes may, in turn, increase social capital within the group. (C) Presents the same level of problem complexity as in B (PC2), only it benefits from a higher level of social capital (SC2). Here it is possible to utilize networked governance processes based on self-steering throughout stages of the governance process. The governance network has the capacity for a certain level of self-organization, autonomy, decentralized power, distributed intermediate modularity roles in problem solving and policy-making, but is highly dependent upon those high-ranking nodes that act as effective intermediate modulators across diverse, various groups which are partly distributed outside of centralized governance authorities. Maintaining this capacity requires a high investment of resources, especially for those high-ranking nodes. (D) Presents the same level of problem complexity as in A (PC1), only it benefits from a higher level of social capital (SC2). Although social capital is insufficient to allow a networked governance process with such a level of self-organization and autonomy as in C, it may be possible to use collaborative visioning processes as in B. In comparison to B, the effectiveness of such collaborative processes is more dependent upon those high-ranking nodes that act as effective intermediate modulators across diverse, various groups. Relative to B, maintaining the capacity for collaborative visioning requires a high investment of resources, especially for those high-ranking nodes.

Where social capital is sufficient to allow collaborative processes within the heterogeneous network, it may be possible to utilize collaborative visioning to create shared value (CSV) among participants (Point "B"; PC2, SC1). Such a process can help improve trust, mutual understanding and shared values and behaviours, and, in time, possibly increase (shift) social capital sufficiently (to the right) as to allow effective reflexive governance, wherein a certain level of autonomy and self-organization is beneficial to long-term policy-making (Point "C"; PC2, SC2). In such a case, self-steering becomes

more conducive to networked forms of governance for sustainable development. Alternatively, it may also be possible to increase the problem complexity addressed within the collaborative visioning framework (Point "D"; PC1, SC2). In the Northern Highland Lake District (NHLD), collaborative visioning was spearheaded by a group of scientist who, through a series of meetings and outreach activities, evoked dialogue about alternative futures with the various groups that eventually made up the governance network (Peterson, et al., 2003a; Peterson et al., 2003b; Carpenter, 2006; see also http://lakefutures.wisc.edu/). Ahead of the collaborative visioning process, there was a central disconnect among Native Americans, lakeshore owners and local nontribal people who were highly dependent on exploitation patterns that a growing number of people believed were untenable (Olsson et al., 2006). Also, the interests of the actors that make up the prevailing governance system were somewhat different across stakeholder groups, including the interests of lake associations, which are in place to perform the adaptive co-management of lakes or lake chains, and those of local actor groups such as local tribes, recreational users, the forest product and construction industries, NGOs and the state management agency. However, by engaging in collaborative visioning which fostered shared visions of the target system, the diverse but interdependent actors experienced the creation of strategic alignment which allowed them to make the step towards reflexive governance, allowing them to achieve collective outcomes and common goals that they may have been unable to achieve if each acted on their own. Visioning served as a starting point for enhancing social capital and subsequently allowed the group to start a process of evaluating policy options in terms of how these would shape the ability of NHLD to respond to potential risks and opportunities (Peterson, Cumming, & Carpenter, 2003). Similarly, collaborative visioning, during the 1980s and 1990s helped shape alternative visions for the future of the Everglades in Florida, and played an important role in the search for and exploration of policy options (Gunderson, 1999; Walker and Solecki, 2004).

The approach to creating shared value can be compared to Pahl-Wostl and Hare's (2004) description of a co-management process as "not a search for the optimal solution to one problem but an ongoing learning and negotiation process where a high priority is given to questions of communication, perspective sharing, and the development of adaptive group strategies for problem solving" (p. 193). In the context of sustainable development, collaborative visioning is undertaken to identify desirable futures and pathways through positive visioning (Costanza, 2000; Inayatullah, 2003; Meadows, 1996; Rotmans, Kemp, & van Asselt, 2001; Schwartz, 1991). Continuous and persistent interaction through this process may facilitate the transfer of tacit knowledge (e.g., Crona & Bodin, 2006; Crona, 2006). Although there are certain futures on which diverse various stakeholders and network participants may not agree, it is possible that, by creating shared visions of sustainable futures, network participants may recognize their interdependent roles in achieving positive outcomes. Through collaborative visioning, participants may build their systems intelligence through second-order learning and may experience the formation of strategic alignment between their individual efforts. Thus the intertwined processes of collaborative visioning and creating shared value, which promote shared visions and strategic alignment, may create social capital within the group and allow network participants to work collaboratively within the problem solving frameworks of networked governance and achieve collectively desirable outcomes that would have been impossible were each participants and their organizations to be acting on their own, outside the networked governance process. Kendrick (2003) described the process as learning to respect differences. We suggest that another essential component is learning to appreciate similarities. In this context of social, self-organized learning, we would consider, based on the work of Armitage, Marschke, and Plummer (2008), the following three learning theories: experimental learning, which is a process of creating knowledge through the transformation of experience and learning by doing (Keen & Mahanty, 2006); transformative learning, which is a reflective process that enables the alteration of individuals' perceptions and consciousness (Mezirow, 1996) and which includes communicative and instrumental learning (Sinclair & Diduck, 2001), and; social learning, which is a process of iterative reflection that occurs when experiences and ideas are shared with others (Keen, Brown, & Dybal, 2005).

Where problem complexity and social capital imply the impossibility of collaborative processes, it may be beneficial to reduce problem complexity sufficiently to allow a collaborative visioning, which would improve the effectiveness of a networked governance process. By solving more manageable problems, network participants may experience the creation of social capital that would allow them to address problems of greater complexity. Wilson et al. (2006), for example, described collaborative ecosystem governance programs which, once successful, tended to become involved in broader environmental and development issues like ecotourism and livelihood enhancement. In one case, a small aquaculture project in the Philippines expanded into other activities through alliances made with local government agencies and nongovernmental organizations (NGOs).

Institutional brokering may play an important role in enhancing social capital and enabling shared value creation. By bridging structural holes and acting as "intermediate modulators," it is possible to stimulate innovation in social organization and learning. In terms of network structures and practices, institutional brokering may reorient patterns of social organization in a way that fosters greater social capital (e.g., Schneider et al., 2003), and thus enhances the effectiveness of networked governance approach. In a case study of the Kristianstads Vattenrike Biosphere Reserve in Sweden, Olsson et al. (2007) describe how such institutional brokering allowed a networked form of governance by matching multilevel governance systems that were previously fragmented in organizational and institutional structures. This matching entailed "creating the right links at the right time around critical issues in multilevel governance systems" (p. 28) and was enabled by the brokering of one organization, the Ekomuseum Kristianstads Vattenrike, which was created for that special purpose.

Where there is insufficient bridging within existing network structures, it may be useful to consider mechanisms that may incentivize such behaviour by key network actors. Strategies may consider methods to instill such incentives within the network, or alternatively, take a proactive role in producing this intermediate modularity, as with the case of the role of the Ekomuseum Kristianstads Vattenrike in the Kristianstads Vattenrike Biosphere Reserve. In the brokering process, it may be useful to identify the asymmetries that characterise the high-ranking nodes across the diverse stakeholder groups. Strategies may consider mechanisms to bridge these asymmetries prior to key steps within the networked governance process such that social capital may be improved sufficiently with this brokering in lock-step with the demands of various collaborative processes and levels of problem complexity. Where there are absent incentives for such bridging leadership within the governance network, strategies may consider methods to instill such incentives within the network, or alternatively, take a proactive role in creating these bridges as with the case of the role of the Ekomuseum Kristianstads Vattenrike in the Kristianstads Vattenrike Biosphere Reserve. Operating within the limits set by actual institutional frameworks and agency conditions, however, the emergence and speed of such innovations in social organization is partly dependent upon the introduction of more flexible, multi-governance systems designed to enhance institutional interaction, experimentation and learning (e.g., Folke et al., 2002; Kooiman et al., 2005).

Section 8. The Importance of Agency

Promoting the importance of social innovations in enabling collaborative governance approaches that are more reflexive, Westley et al. (2011, p. 762) describe the role of institutions, agency and innovation in "navigating shifts and large-scale transformations toward global sustainability." They take the view of Hwang and Christensen (2007), and propose that a transition to reflexive governance can be triggered or "catalyzed" by systemic social innovations that address the needs of those not yet served by the dominant institutional or organizational systems, including the governance system, which they compose. These are innovations in social structures and practices that may sufficiently reconfigure and reorient patterns of social organization so as to allow a higher level of shared value creation, and thus lower the barriers to effective social organization under a networked governance process. Olsson, Folke, & Hahn, (2004), for example, describe the agency process by which previously unconnected stakeholders were mobilized towards the sustainable management of an ecosystem. Based on a case study of the Kristianstads Vattenrike Biosphere Reserve in Sweden, they describe the role of agency at three stages of the transition from a technocratic to a networked governance approach: (1) preparing the system for change—linking nature to culture, building local ecological knowledge, providing a vision and developing social networks; (2) using a window of opportunity—linking changing internal and external conditions to capitalize on opportunities, and; (3) building resilience of the desired state after inception—these include leadership, trust, enabling legislations, funding for responses to change, monitoring and responding to feedback, facilitating information flow through social networks, and establishing arenas for collaborative learning. Agency played a key role in the establishment and the development of the Ekomuseum Kristianstads Vattenrike.

To this effect, Westley et al. (2011) describe how such innovations can emerge through top-down and bottom-up processes. As top-down approaches, they encourage reflexive law, adaptive management and transition management as approaches that encourage adaptive learning, exploration and experimentation among public, private and civil sector actors, and thus stimulate shared value creation. These approaches recognize that reflexive governance sometimes requires those closest to the problem to shape and define solutions, and that to do so certain collaborative platforms must be put in place to encourage the process.

Noting that there are sources of innovation in most social systems that are overlooked in top-down approaches, they acknowledge that top-down-only responses to problem solving—because of their inherent rigidity and incongruence with a complex governance context, and their emphasis on speed and avoiding blame—often miss the opportunity for learning and innovation (Walker & Westley, 2011). Agency, in the form of social, political and institutional entrepreneurship, can lead important systemic innovations to emerge from the bottom-up (e.g., Grindle & Thomas, 1991). Such innovations can be supported by:

- Enhancing local, agency-level innovative capacity by establishing the conditions for social learning and institutional memory (stimulates innovation);
- Encouraging and enabling local, agency-level exploration and experimentation (empowers innovation); and
- Connecting innovative ideas to institutional resources and opportunities (broadens the innovation's impact and durability).

Due to the sheer complexity, ambiguity, multi-scale and multilevel character of shared value creation, agency must play a role at multiple stages of the process. Networks working inside and within the dominant system can thus serve as incubators for new ideas and approaches to governance. The following network types may be helpful to this effect:

- Policy communities (Shannon, 1998)
- Epistemic communities (Haas, 1992)
- Informal/ shadow networks (Gunderson, 1999; Olsson et al., 2006)
- Learning networks (Pahl-Wostl, 2002)

Agents and organizations that are involved in and affected by the problem at the local scale harbour not only the necessary capacities for reflexive governance, but also the capacities to foster shared visions, strategic alignment and the structural bridging necessary to make effective social organization viable under a networked form of governance. Agents at multiple levels can play an especially important role by providing leadership, building trust, developing visions and sense making (e.g., Gutierrez et al., 2011; Huitema & Meijerink, 2009; Olsson, Folke, & Hahn, 2004; Westley, 2002), as well as being brokers for connecting ideas, people and networks (e.g., Bebbington, 1997; Ernstron et al., 2010; Manring, 2007). By stimulating local actor's involvement in such entrepreneurship, empowering them to learn-by-doing, and connecting their innovative ideas to institutional resources and opportunities, it is possible to support the emergence of new social structures and practices that might develop to meet the social organization needs that are not currently being met under a certain governance approach (Westley et al., 2011). Innovations spurred by entrepreneurial agents can reorient agency- and organization-level opportunism towards shared value creation, create technological and rules-based (incentives and governance) platforms for productive and efficient collaboration, and provide a compelling motive for key decision-makers to relocate governance processes away from their traditional location, towards a greater diversity of distributed actors.

Section 9. Conclusion

When governance problems attain a certain level of complexity, it is thought that a variety of actors, both inside and outside government, may interact to create solutions that governments or other centralized governance authorities may otherwise have been unable to generate by themselves. Such distributed capacities range from differing worldviews, information, relationships, unique structural positions, leadership, superior communication and mediating skills, power, trust, and different forms of knowledge concerning the dynamic conditions of both the governance context and the forces shaping internal problem solving practices and structures of organization. Networked governance, as a decentralized, integrative form of problem solving, is promising because it allows actors outside of government to contribute their unique resources to the generation of creative, collaborative, complex solutions. This view is taken by an increasingly large community of policy leaders. As the world prepares for Rio+20, the UN Secretary General's High-level Panel on Global Sustainability (2012) has advised that sustainable development is "about recognizing, understanding and acting on interconnections—above all those between the economy, society and the natural environment." To this end, there is a great need to strengthen institutional governance and overcome the legacy of fragmented institutions.

Collaboration, however, is not a given. An effective networked governance process requires a certain level of social capital. Where social capital does not exceed a certain threshold, collaborative governance processes may be subject to efficacy constraints; tackling a problem for which network participants and structures harbour an insufficient amount of social capital may be counterproductive. Applying stakeholder analysis can help identify stakeholder categories, ensure key groups are included, and specify representatives that are well connected and respected with the groups they need to represent in networked governance. Applying social network analysis can help assess optimal relationship configurations (patterns of social organizations) that may maximize social capital, and thus the ability of governance participants to work towards productive public outcomes.

Under conditions of insufficient social capital, engaging in networked governance may erode the fabric of trust and collaboration, subjecting participants to conflict, destructive opportunism and power struggles, further entrenching a confrontational (us-versus-them) mentality. Where social capital is insufficient, it may be best to engage in collaborative visioning exercises that allow the sharing of various resources while restraining opportunistic behaviour. Through such a process, actors learn about each participant's positions (informational, relational, motivational, etc.), gain a level of understanding and respect for other participants' views, and transfer this learning into a deeper appreciation for collaborative governance. As such, it may be possible to create shared value among network actors and increase social capital within the group, thus allowing for greater autonomy and self-organization within a networked governance process, or enabling the network to address problems of higher complexity.

Governing by networks is complex. Whereas technocratic problem solving processes facilitate the achievement of organizing functions but prevent reflexive solutions to our most complex problems, polycentric forms of governance promise the achievement of superior solutions at the expense of a relatively more complicated and possibly heavily resource-intensive and socially constrained problem solving process. The efficacy of networked governance is thus in constant flux. A slight change in internal or external conditions of the governance network can generate sufficient shifts in context as to eliminate the possibility of an effective collaborative process. Therefore, undertaking effective networked governance demands the manifestation of certain high-ranking nodes that can properly adapt organization patterns to respond to shifts in participants' priorities, motivations, information, capabilities and other resources that they may bring to the fore. The process of networked governance itself introduces an additional component of complexity. This complexity, if unmanageable, can undermine the problem solving process. Technocratic processes do not have this problem.

As implied by the frontiers of networked governance (efficacy and collaborative visioning), collaborative processes are not recommended for all sets of complex governance problems. There are some problems for which complexity and social capital diverge sufficiently that technocratic processes may prove to be the best investment of time and other resources for governments and other participants (or non-participants); choosing a networked process in these cases could come at a high opportunity cost for all involved, and generate net negative outcomes of governance and social capital. Those considering networked governance need to beware of the many pitfalls. Acknowledging these pitfalls however, across highly complex problems for which governments do not harbour the required capacities, is analogous to acknowledging side-effects, negative repercussions and externalities from problem solving processes that are inadequately reflected, oriented and supervised absent the necessary preconditions for collaborative problem solving.

The viability of a networked governance approach can be enhanced by making existing institutions more flexible and by encouraging institutional brokering. Governance and regulatory frameworks that encourage organizations and individuals to engage in this process may create the preconditions necessary for effective social organization under a decentralized, collaborative governance approach. Moreover, governments can strengthen capacities for bottom-up systemic social innovations by encouraging and supporting the role of agency to this effect. Whereas much has been said about the role of knowledge brokering (e.g., network management), there is now a greater need for other forms of institutional brokering by high-ranking nodes that may mediate resources, including not only information but also many other resources such as relationships, power, trust, motivations, and so on.

We have emphasized that agency and structural characteristics of governance networks and their institutional context have important implications for networked governance processes, and we explained how a combination of stakeholder analysis and social network analysis may be used to optimize patterns of organization so as to facilitate the achievement of organizing functions. However, future research is needed to identify the procedural rules and process management practices that are conducive to sustaining and improving the ability of network members to create shared value under collaborative visioning and other organizational processes. Learning, as discussed briefly in section 4 plays an important role in this process, and more research is needed to inform network practices that may influence its direction and intensity (e.g., Sinkula, Baker, & Noordewier, 1997). More empirical research (e.g., Klijn, Stejin & Edelenbos, 2010; Meier and O'Toole, 2001, 2007) is needed to trace the influence of such procedural rules and process management on the performance of governance networks.

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Appendix

Policy Networks (or Global Policy Networks), which—due to their broad membership—tap information and expertise from a wide variety of backgrounds, give voice to previously unheard groups and provide a more complete picture of particular policy issue (Reinicke & Deng, 2000). As such, they help governments and multilateral agencies manage risks, take advantage of opportunities presented by technological innovation, be more responsive to constituents, and promote change within bureaucracies: They respond to the operational and participatory gaps in global governance.

According to Reinicke and Deng (2000), these networks can best be understood in terms of a four-stage policy cycle:

1. Agenda setting (raising awareness and pushing issues onto the global agenda)
2. Negotiation (applying decision making processes)
3. Implementation (translation results of negotiations into action and developing or improving a willingness or capacity on the parts of stakeholders to comply)
4. Policy reformulation and institutional learning (facilitating learning and changes in the network)

The achievement of sustainable development also depends upon appropriate investment in learning and capacity development in order to generate the required knowledge, skills and technology. **Knowledge networks**, which can consist of organizations from the NPO, government and private sector, "facilitate information exchange toward practice related goals (Kurtz and Snowden, 2007)." Their activities are described by six main functions (Mendizabal, 2008):

1. filtering
2. amplifying
3. investing and providing
4. convening
5. community building
6. learning and facilitating

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