



Governance for Systemic and Transformational Change: Redesigning Governance for the Anthropocene

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ABSTRACT

We live in an era of uncertainty and volatility. Rapid technological change, inequalities in income and opportunities, environmental deterioration, social disruptions and political divisions are upending our political, social and economic orders. Humanity's best defence against these multiple and escalating crises of the Anthropocene is our capacity for collective action on an extraordinary scale. The challenge of governance today is how to bring about a systemic transformation of our politics, economics and society that will allow liberal democracy, a fair capitalism and a regenerative natural environment to cohabit amicably. To do so at the pace and scale needed requires far more imaginative, flexible, adaptive and responsive governance than our current arrangements can offer. In an evolving information and digital epoch, our governing mechanisms—top-down steering, market-based transactions and self-organized networks—must be rethought with new relationships among States, firms and civil society. This paper examines current deficiencies in governance and proposes a new approach to orchestrating systemwide transformational change that involves balancing three key relationships: State and market, labour and capital, and nature and humanity. It then uses a complexity lens to advocate four principles for redesigning institutions and policy—systemic thinking, meaningful transparency, political and social inclusion, and effective subsidiarity.

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Introduction

“Getting and spending we lay waste our powers. Little we see in nature that is ours.”

—William Wordsworth

“Not ignorance, but the ignorance of ignorance, is the death of knowledge.”

—Alfred North Whitehead

This is a century of complexity, uncertainty and volatility, driven by rapid technological change, income and wealth inequalities, social dislocation and political schisms. Underlying it all, climate change and ecosystem devastation are reshaping the biosphere and further threatening the stability of humanity’s political, social and economic orders. Human influence on the biosphere is threatening food systems, health, political stability and economic prosperity around the world—and the pace is accelerating. Climate change is but one of several consequences as we alter the environment with reckless abandon.¹ The project of sustainable human development appears both more urgent and more fraught than ever.

Concurrent and interdependent crises, the ‘polycrisis’, require changes in the systems that are generating the disruptions, not just tweaks to existing ways of creating, using and disposing of the material substrate of human society.² Yet at the same time, people still need to use food, energy, transportation and all the other features of human civilization daily. This use needs to be reasonably equitable, if for no other reason than because worsening inequality imperils the social and political resilience needed to transition to new, more sustainable systems.

New technology is necessary but not sufficient. Technology does not deploy itself or automatically change human behaviour. Societies need to collectively decide to do an array of things differently—and then actually do those things. Change, therefore, depends on the efficacy of processes for making and implementing major decisions throughout society—in a word, governance.

In the face of the disruptions of the twenty-first century, humanity’s best defence is its capacity to act collectively on an extraordinary scale. We live in a world that will flourish or fall apart depending on whether we can collectively govern our way to a more stable, sustainable and just prosperity for all, one that can

¹ See, for example, Steffen et al. 2015, UNDP 2020, Quiggin et al. 2021, Armstrong McKay et al. 2022, IPCC 2022 and UNDP 2022.

² While systemic risk expresses the potential for failure in one part of a system, or subsystem, to disable the whole, a polycrisis refers to the actual realization and causal interactions in unfolding interdependent crises (Lawrence, Janzwood and Homer-Dixon 2022). Complex systems have fuzzy internal boundaries demarcating subsystems. How you ‘sub-divide reality’ depends on the analytical purpose or the question under investigation. See, for example, Florini and Sharma 2020, White 2020, Sharma and White 2022, and Thalheimer, Webersik and Gaupp 2022.

withstand the shocks and ever more challenging conditions that ensue as we bump up against, and cross, planetary boundaries.

This paper starts by defining governance and the need for a new approach to systemic and transformational change. It then examines how current approaches to governance fall short. It analyses and advocates four broad principles of governance for rethinking institutions and policy. A final section pulls together key arguments about why a new approach to governance is needed and how it can be achieved. It calls on leaders and citizens everywhere to adopt a systemic approach to governing.

Governance and systemic transformation

The *Oxford Handbook of Governance* provides a tongue-in-cheek definition of the term: “Governance is said to be many things, including a buzzword, a fad, a framing device, a bridging concept, an umbrella concept, a descriptive concept, a slippery concept, an empty signifier, a weal word, a fetish, a field, an approach, a theory and a perspective” (Levi-Faur 2012, p. 3). But somewhere in this slippery concept is a core of meaning about how order emerges in societies through modes of influence and control that may—or may not—involve the State (Levi-Faur 2012; Risse, ed. 2013).

At its most basic, governance includes ways of providing public goods and redressing negative externalities. But governance in the twenty-first century needs to cover a much wider range of functions.³ Schneider (2012) provides perhaps the broadest usable definition: “Governance is the production of social order, collective goods or problem-solving through purposeful political and social intervention, either by authoritative decisions (hierarchical governance) or by the establishment of self-governing arrangements” (pp. 130–131). In this broad approach, governance means not just rulemaking but the entire policy chain from short-term to long-term rules and up to the level of constitutive arrangements and culturally embedded norms (Finnemore and Sikkink 1998).

Over the past two centuries, governance has depended on increasingly large, hierarchical public and private bureaucracies. Such entities were designed for conditions of regularity and predictability rather than those of extreme volatility or system transformation. When they function well, such bureaucracies are remarkably effective at addressing complicated problems, applying rules developed through experiences and analyses that draw on historical data. They have enabled societies to generate an enormous surge of economic activity, sparked by the multiple industrial revolutions of the past two centuries, all fuelled, literally, by millions of years’

³ See Samuelson 1954, Ostrom 1990 and 1992, and Florini 2003/2005 and 2019.

worth of fossilized sources of energy. That economic activity has transformed the lives of billions of people, though at the cost of the biosphere and of groups barred from sharing in the benefits.

But the twenty-first century is different. It will feature physical volatility on a scale not seen in millennia, as humanity pushes ever farther past the planetary boundaries that defined natural cycles in the Holocene's 12,000-year period of planetary stability.⁴ In this new age of uncertainty and volatility, the Anthropocene, humanity's economic and political paradigms need to shift their purpose from efficiency to resilience.⁵ And that poses a challenge for large hierarchical bureaucracies.

We need changes in how we govern. This transition in governance is essential for making our systems sustainable and resilient.⁶ Just as the Industrial Age has given way to the Information Age, the Age of Oil must give way to the Era of Renewable Energy, and the Age of Bureaucracy must give way to the Era of Complex Governance. And just as industry will not disappear, neither will bureaucracy. But such bureaucracies must be components of multisectoral, layered governance involving governments, firms, civil society and many types of networks.

GOVERNANCE AND COMPLEXITY

Complexity theory provides the basis for understanding why a different approach to governance is necessary. Complexity is less a theory than a framework for thinking about systems that have certain characteristics.⁷ In complex adaptive systems, these characteristics include:

- The presence of many interacting elements
- The ability of each element to adapt and change its behaviour in response to changes in its environment
- Heterogeneity among those individual agents, i.e., differing capacities, capabilities and preferences
- Interaction among agents, such that they 'observe' one another's behaviour, respond, imitate, communicate and bargain⁸

⁴ See Steffen et al. 2015, Hendry and Castle 2021, and Quiggin et al. 2021.

⁵ See, for example, Kirman 2010, Florini and Sharma 2020, Kupers 2020, Brunnermeier 2021 and Yellen 2022. See Lewis and Maslin 2015 on defining the Anthropocene.

⁶ An immense amount of scholarship has explored the structure and efficacy of alternative governance arrangements. Elinor Ostrom, for example, building on a term introduced by Michael Polanyi, developed and applied the concept of polycentricity, or a governance system of multiple, loosely connected decision-making centers operating under a shared or compatible set of rules or norms. See Polanyi 1951 and Ostrom 2010a, 2010b and 2010c.

⁷ For a perspective on complexity and networks science, see Caldarelli 2020, and on the logic of networks and their relevance for markets and human societies, see Jackson 2008 and 2019, Goyal 2009, and Easley and Kleinberg 2010.

⁸ See, for example, Epstein and Axtell 1996, Arthur 1999, Kirman 2010, Schneider 2012, and Colander and Kupers 2014.

Order emerges out of these interactions. Anyone who has witnessed the murmuration of thousands of starlings or the abrupt appearance of what look like broad moving aisles when sharks swim through schools of millions of anchovies has seen such emergence of order in action. To the human eye, these phenomena appear choreographed. But they are simply the aggregate effect of the choices made by each individual fish or bird in response to the choices of its neighbours, choices bound by clear rules: Don't get too close, don't stray too far, shift this way when your neighbour moves that way, and so on.

Nature and humanity are composed of complex systems from which order emerges. Individual bees work together to produce a hive. Cells in our bodies interact to generate immune responses to viruses. Ten million people jostle and hustle each day to create the city of New York. And buyers, sellers, producers, suppliers, distributors, consumers, regulators, brokers and countless others interact to create modern interlinked markets.

Such order cannot be predicted by knowing the attributes of individual agents and adding them up. The sheer number of interactions, and the rapidly multiplying variety of possible outcomes from those interactions, far exceed our analytical capabilities, given that tiny and often unobservable variations in one part of the system have the potential to ripple widely. Non-linearity is common in such systems because a small change in one part may propagate rapidly, affecting other agents enough to alter the whole system—the phenomenon of tipping points.

This way of thinking contrasts sharply with existing approaches to governance and with the mindset that underlies most standard economic models. For many decades, we have been taught to engage with the world as if it were constituted of machine-like components that can be taken apart and put together in predictable linear systems, ones in which cause and effect are discernible, and people and organizations behave in consistent ways (Kahneman 2011). This is the basis of *ceteris paribus* economic models and much of the thinking that informs policymaking, which makes rules that apply equally to all. This worldview, however, often clashes with a reality of considerable heterogeneity, inconsistency and tipping points that produce outcomes that are neither predictable nor linear.

Nonetheless, all those complex interactions do often add up to patterns that emerge and can be shaped and guided, to a degree. Policy, governance and institutions can serve as the shapers. This does not mean that policies, even if designed for complex systems, will always have predictable effects. That is not how complex systems work. With humility, flexibility and an experimental mindset, however, it is often possible to nudge systems into more, rather than less, desirable states (Meadows 2008).

To see what happens when a complex system is treated as though it is merely complicated and interactions among the parts are ignored, take the Great Financial Crisis of 2008. The complexity of the financial system

meant that a crash in home prices in the United States of America could trigger a global crisis that wiped out trillions of dollars of value, brought advanced country financial systems to the precipice of collapse, left tens of millions jobless, and spawned social and political upheavals that continue to disrupt societies to this day. At the time, each of the components in the US financial system was subject to oversight. But the regulatory agencies in charge were focused on their own domains, on the lookout for risks to individual institutions. No governance body had a view of the other players, an understanding of how the pieces were connected or a mandate to oversee systemic risk.⁹

Global finance is but one of many subsystems; others include food production, manufacturing, energy, transportation, and media and communications. A governance approach that ignores the broader system in which an organization, market or institution is embedded will lack resilience and fail to ensure prosperity, security and sustainability. But existing approaches to governance and collective action do not have the capacities needed for governance of the complex reality humanity faces in the Anthropocene. We have yet to bring together our mechanisms of top-down steering, market-based transactions and societal networks in a coherent way (Schneider 2012, Colander and Kupers 2014).

The next section explores our existing approach to governance with respect to governments, markets and society, and argues why and how governance is falling short.

Current governance approaches—and how they fall short

Human society has always involved a complex interplay of politics, economics, technology and social forces, all embedded in the natural systems on which they depend. Yet the sheer scale of human interactions in a world with a population that has more than quadrupled over the last hundred years, combined with vastly increased economic activity conducted through dense networks of connections around the globe, has greatly increased the scale of that complexity and the effects on those natural systems.

Moreover, despite technology and market liberalization that have helped millions rise out of poverty and reduced inequality between countries, income and wealth inequality *within* many countries has risen over the period from 1990 to 2020.¹⁰ Even in functioning democracies, market forces have grown far more powerful, especially with the consolidation and monopolization of finance and technology firms. And in society, the erosion of trust and social cohesion, driven in no small part by a fractured information landscape, is causing

⁹ See, for example, Agur and Sharma 2015 and 2022, Skidelsky 2018, Tooze 2018, Arner et al., eds. 2019, and Daniélssoon 2022.

¹⁰ See, for example, UNDP 2019, Conceição 2020 and Chancel et al. 2022. The United Nations estimates that 71 percent of the world's population lives in countries where inequality has grown, and these countries include many advanced and middle-income economies.

conflict and division that is reducing the ability to generate collective action. Democracy is demonstrably in decline as autocrats use technology to strengthen their grip, fragile democracies backslide, and even many mature democracies exhibit oligarchic and authoritarian tendencies (Repucci and Slipowitz 2022).

Below we examine these phenomena and dig deeper into how we have arrived at this point—with systems of governance and collective action that are not fit for the challenges of the Anthropocene.

GOVERNMENTS AND WHY THEY CANNOT SOLVE EVERYTHING

Over the past century, assumptions that national governments, rather than other types of human organization, should manage large-scale collective problems have become deeply embedded (Florini 2003/2005, Saez 2022). Only such governments, with their coercive capacities and claims to represent the interests of all, have the wherewithal to build the institutions needed for proficiency at large-scale war. And the first half of the twentieth century was dominated by wars on a scale never seen before, followed by a Cold War that fostered an enormous military-industrial complex. In times of peace, governments have responded to the spread of democratic franchises by offering ever more services to their broadening constituencies, creating welfare States in some wealthy countries with high tax levels and associated bureaucracies.

As a result, national government has come to be seen as the primary if not sole source of legitimate governance: the setter, implementer and enforcer of the rules by which societies operate; the provider of public goods that markets fail to deliver; and the regulator of externalities that market and social actors inadvertently create. Citizens in most of the world now expect their governments to provide a vast array of collective goods and services that simply did not exist in earlier times, from advanced communications and transportation infrastructure to guarantees of citizens' rights to the macroeconomic conditions for prosperity in complex societies (Florini 2003/2005). And governments are assumed to be where we can find the fiscal, legislative and regulatory tools to push the economy and society towards more sustainable practices, such as cutting carbon emissions and preparing for infectious disease threats. Government has the resources and legitimacy to shape public behaviour and deliver public goods, such as public health and education.

Such expectations often go unmet, of course. A lack of resources and outright corruption have left many societies with fewer such goods and services than their citizens might desire. Solid empirical evidence shows that corruption and poor governance correlate with lower economic growth, investment and tax revenue, and governments captured by vested interests are liable to hinder societally needed changes rather than bring them about.¹¹

¹¹ Steinberger 2018, Acemoglu and Robinson 2019, and Ivanyina and Salerno 2022.

But the limitations of government, as now constituted, are even more fundamental.¹² The typical and widespread approach to government currently is, by its design, unable to cope with rapid, constant change. Government consists of bureaucracies that break interconnected problems apart and assign them into separate policy silos. Those silos strive for silver-bullet, ‘best practice’ technical solutions to problems that defy such simplistic fixes, using rules that stretch awkwardly across extraordinary heterogeneity. Even if government organizations and officials are pure of heart, highly capable and working solely for the broad public interest, siloed and hierarchical governance via such institutions is effective only in situations of high predictability and low complexity. But they fail when problems cannot easily be teased apart, and when no one knows or can know underlying ‘risk’ distributions.

Beyond this fundamental design flaw, four newer conditions are rendering the tasks of governments ever more difficult. Three of these flow from the digital transformation of society described in the sections below. The first is the political polarization exacerbated in part by inflammatory media. The second is the tendency towards monopoly and concentration in the information age, and the economic, legal and political challenges this presents for capitalist democracies. The third is that digitalization is in many ways making it more difficult for governments to collect the resources needed to orchestrate large-scale collective action. The taxation of services and multinational corporations and the control of illicit money flows have become much more demanding. The Organisation for Economic Co-operation and Development has still not abolished the anonymous ownership of income and assets. And international tax rules slanted against the lower-income countries deny them the right to tax effectively the economic activity in their jurisdictions.¹³

The fourth fundamentally new condition is the mismatch between the geographic scope of national governmental authority, the planetary scale of the Anthropocene’s challenges and the local specificity of the impacts of those challenges (Blake and Gilman 2021). Nation-states respond to national constituencies and thus do not effectively engage in collective action at the planetary scale. At the same time, the impact of planetary boundary-busting varies at the local level—e.g., extreme temperatures, rising sea levels, fires and droughts in some places, floods in others—so that the sheer heterogeneity overwhelms the capacity of even the best-resourced and best-intentioned national governments.

CRAFTING MARKETS AND FIRMS HAS BECOME HARDER

Markets as institutions are embedded in society and influenced by governments, businesses, non-profit entities, labour organizations, social networks, and the practices of a specific time and place.¹⁴ They are also

¹² Scott 1998, Florini 2003/2005, and Colander and Kupers 2014.

¹³ Florini 2003/2005, Keen and Slemrod 2021, and Cobham 2022.

¹⁴ See, for example, Polanyi 1944, Granovetter 1985, Fligstein 2001, Hall and Soskice 2001, Nee and Swedberg, eds. 2005, Hockett and Omarova 2014 and 2015, and Vogel 2018.

social institutions, and their construction is influenced by societal norms and cultural patterns. The evolution of markets, and ultimately their survival, stability and functioning, depends on the nature of the relationship between governments, corporations, intermediaries and the personal networks in society, and on how power and influence are distributed. North (2005) stated it eloquently: “Humans attempt to use their perceptions about the world to structure their environment in order to reduce uncertainty in human interaction. But whose impressions matter and how they get translated into transforming the human environment are consequences of the institutional structure, which is a combination of formal rules, informal constraints, and their enforcement characteristics” (p. 6).

Modern markets do not arise naturally or spontaneously. They are part of a panoply of institutions that must be crafted.¹⁵ Markets require infrastructure and rules for operation, including legal statutes, property rights, payment and settlement systems, and monetary and regulatory regimes. Governance is aimed at creating order, mitigating conflict and realizing mutual gain. In addition to ex ante incentive alignment in the design of contracts, ex post monitoring and contract enforcement is required. In his Nobel lecture, Coase (1992) states that “without the appropriate institutions no market economy of any significance is possible” (p. 714).

Capitalist democracies have fallen short in multiple ways. The dense and complicated relationships among States, corporations and peoples, not to mention the natural environment that sustains them all, is badly strained. Over the last half century, balances of power in such countries, between the State and corporations, and between capital and labour, were upset. Many societies settled into favouring private markets at the expense of a well-functioning State.¹⁶ The corporation was reimagined as having a single purpose: maximizing returns to financial capital, even at the expense of social and natural capital.¹⁷

The ‘corporation’ that is fundamental to modern capitalism has been given legal identity and endowed with limited liability by the State. There is nothing natural or spontaneous about how corporations are defined and the privileges they are given. Stock markets are designed with trading rules, corporate accounting and disclosure requirements, and rules to prevent insider trading and manipulation. Without such rules, they would not be able to operate. Such rulemaking and constraints should not be seen as intervening in markets but rather as intrinsic to the design and creation of fair and efficient markets.

To be sure, regulations are not perfect and not always beneficial. Government regulations impose costs and constrain markets. Regulators can be captured and governments corrupted. But regulations must be judged by

¹⁵ See, for example, North 1990; Simon 1991; Williamson 2000; Rajan and Zingales 2003; Acemoglu, Johnson and Robinson 2005; Chami, Fullenkamp and Sharma 2010; Rodrik 2011; Vogel 2018; Basu 2018; Baland et al. 2020; Wilmarth 2020; Admati 2021 and Rakoff 2022.

¹⁶ See, for example, Gerstle 2022.

¹⁷ Friedman 1970; Stout 2012; Pistor 2019; Bakan 2020; Zingales, Kasperkevic and Schechter, eds. 2020; Hall 2022 and Zammit-Lucia 2022.

counterfactuals in an evolving world of inequities of power and information, distortions, externalities and transaction costs.

If designed right, governmental and societal regulation of markets can have enormously positive impacts. As Zammit-Lucia (2022) states, the regulatory and oversight structure has “the potential to create the conditions for new business activity and desired behaviours to emerge spontaneously. It can achieve systemic change through emergent effects and has the potential to drive innovation, to make industry more competitive and forward-looking. Above all, the legal and regulatory framework is the mechanism through which societies can answer some fundamental questions such as ‘What is a business for?’” (p. 99).

Market fundamentalism, financialization, globalization and the emphasis on shareholder value have militated against government intervention and oversight. Corporations have become dedicated to maximizing short-term profits because of ideology and investor expectations. Managerial decision-making has been increasingly subordinated to the precepts of financial intermediaries and asset managers. This has led to a more transactional approach to managing corporations, the severance of long-term relationships between firms and their employees, and the outsourcing of functions and services. Stagnant wages and productivity, rising economic inequality, greater financial insecurity and the deteriorating environment are ‘social’ issues that have been left to governments to deal with.¹⁸ The market economy has been shielded from demands for redistributive and social justice (Slobodian 2018, Gerstle 2022).

Markets have been treated as though on their own they would produce a desirable economic and social order. The consequences have not been benign. Unfettered capitalism and delegitimization of State activity have not produced higher long-run productivity or been good for democracy. The increasing concentration of economic power in capitalist democracies has led to higher prices, lower wages, less business dynamism and innovation, lower growth and fragile supply chains.¹⁹ These consequences, coupled with rising inequalities and environmental despoilment, have created systemwide fragilities that threaten political stability.

With the ascendancy of the private corporation in public and private life, the social contract between the citizenry and their elected representatives has changed to give primacy to corporate efficiency over public welfare. Corporate power is used to extract concessions from the State and elicit policies favouring corporations over labour, society and nature. Business and the affluent pursue their interests, while making it difficult for the political system to provide public goods and social infrastructure or introduce policies to stem rising wealth and income inequality, even as profits accrue at the expense of higher worker and consumer

¹⁸ Kuttner 2018, Applebaum 2021, Lemann 2019, Rajan 2019, Sitaraman 2019, Case and Deaton 2020, Collier et al. 2021, Milner 2021, Obstfeld 2021, Jacoby 2022 and Shafik 2022.

¹⁹ See, for example, Lynn 2010, Admati 2017, Kurz 2017, Tepper and Hearn 2019, Hearn and Meagher 2022, and Ma 2022.

indebtedness.²⁰ As Hearn and Meagher (2022) put it: “...the single-minded focus on profits above all else, led to a corporation elevated to such high political stature that it undermined the countervailing mechanisms of the state and polity altogether” (p. 33). There are current efforts for corporations to ‘do good’ and also ‘do well’ but the institutional incentives and the imperative to compete and maximize narrowly defined returns to capital limit the benefits to society (Coyle 2022).

The changing structure and logic of markets

New technologies are rendering overreliance on market forces ever more problematic. In the latter half of the twentieth century, the regulatory framework assumed that market mechanisms could reconcile producer and consumer interests relatively efficiently. State intervention was restricted to enforcing the basic rules of commerce, correcting market failures, and containing pollution and other harmful by-products. But in the twenty-first century, in addition to dealing with traditional externalities, the regulatory framework must grapple with the realities of the information age and a world of digital platforms. In this world, markets do not readily align interests, requiring new kinds of policy and regulatory interventions. This makes the regulatory and supervisory challenges not simply different but much harder.

Previously, business harms came largely in the form of externalities, such as pollution or labour abuses, that were incidental to production processes. Stopping pollution or requiring better treatment of workers—though sometimes increasing the costs of production—did not fundamentally change the product. Now the very nature of digital products is problematic since so much of the financial return depends on data collection and processing in ways that make people themselves (or rather their personal data) the product being transacted. The location of the regulatory problem is thus at the core of digital capitalism.

Information and digital technologies are giving birth to a new and complex social, economic and political order that is spontaneously emerging from individual self-interested behaviour and raising new issues in market governance. In this new order, we see a change in the structure and logic of markets:

- The production of services is becoming more important than the production of physical products, and the services are increasingly digital, relying on phenomenal computing power and the collection, storage and analysis of information.
- The potential scale of markets for services and goods in a digitally connected world is expanding dramatically.

²⁰ On inequality and its consequences, see, for example, Krugman 2009, Stiglitz 2013, Piketty 2015, Galbraith 2016, Sitaraman 2017, Boushey 2019, Milanovic 2018, Price and Edwards 2020, Taylor and Ömer 2020, UNDP 2019 and 2020, and Petrou 2021.

- Many digital markets and digitally transformed traditional markets have an inherent tendency to concentration and monopolization.

These changes are giving birth to a capitalism that differs dramatically from that created by the central tenets underlying industrial capitalism. Until recently, the interests of producers and consumers were aligned by the market, and success for producers was achieved by making a better or comparable product for consumers compared to competitors, ultimately leading to higher profits for successful firms and higher welfare for consumers. In the digital services marketplace, such old suppositions fall short (Plunkett 2021a, 2021b).

Digital platforms are two-sided markets offering a virtual interface that allows buyers and sellers to interact and contract. In such a world, where the cost of sharing digital products is negligible, the main expense is not the search costs of finding suitable trading partners but the costs for assessing trading partners, verifying authenticity and signalling one's own reliability in doing business. This places the digital platform at a tremendous advantage since it accumulates data on both parties to a contract. Trust in the information provided by the platform to buyers and sellers about each other becomes a central element for success and raises questions about privacy and the protection of data. To succeed, the platform may also influence competition among sellers and the prices charged for products and may monitor their quality (Tirole 2017).

Moreover, on electronic platforms, many of which provide services for free, the user of the platform has become the 'product'. Digital business or social media platforms, or search engines, serve as mechanisms for harvesting user data, and even manipulating and changing the preferences or behaviour of the user. Here the 'side products' of data generation and collection are the key outputs. The information has value since it enables the intermediary to produce algorithms that entice the user to stay and keep providing data, which in turn is valuable to other firms for advertising, displaying and selling products and services.

Companies are in effect selling a meta-product, the ability to influence a person's preferences and affect their behaviour in the economic, social and political spheres. This generates a profit motive for developing better techniques for collecting data and using them for advertising and preference and behaviour modification. Not only has this changed the way business is conducted but it has also changed the nature of social and political discourse. It is raising fundamental issues related to confidentiality, who owns the data generated on digital platforms, and whether it is ethical to use such data to 'influence' the mind of the average citizen. Advertising and information provision have done that in the past but now the scale and degree of intrusion into personal behaviour is of another magnitude altogether.²¹

These now ubiquitous tech platforms are transforming products into software services at scale. For example, retail and payment options convert a traditional one-time transaction into an ongoing purchasing and financial

²¹ See, for example, Akerlof and Shiller 2015, and Zuboff 2019b.

relationship in a networked digital environment. This may offer great convenience in some respects by altering the relationship between consumers and producers but it also confers substantial power to the mediating service platforms.

Platforms and information technology markets are highly concentrated for two reasons. First, due to network externalities, the success of a platform depends on the size of the network. Buyers and sellers both want to be on platforms where the other side of the market is large. The second, a scale advantage, flows from the first in that once a platform is established (and the fixed costs borne), the low incremental cost of delivering the service allows for a rapid increase in customers, revenues and profitability. And as information technology advances, it dramatically lowers the cost of processing, storing and transmitting large amounts of information, independent of scale. As mentioned earlier, this creates a strategic asset: detailed information on customer preferences and behaviour. For first movers, the combination of scale and the collected information is a source of market power, and almost impossible for smaller and possibly more innovative start-ups to counter.

Digital platforms and firms are raising new issues of competition and contestability. When platforms integrated across multiple lines of business, and providing market access and other infrastructural or utility services to commercial enterprises, compete with these same commercial enterprises themselves by offering similar or identical products, they create conflicts of interest that could reinforce platform dominance, stifle competition and lower innovation.²² Bundled digital products by dominant firms, say, a combination of hardware and software that includes components manufactured by different external suppliers, are raising issues of intellectual property rights and questions regarding the attribution of responsibilities should there be a malfunction. It is difficult to produce general rules for tech platforms and digital products and services and for the contestability of digital markets. We do not yet have good models for the socially desirable design of such markets, much less sufficient insight into how they should be effectively and efficiently regulated.

Information by its nature is a 'reusable' resource, in that it is non-exclusionary and can be used for multiple purposes and businesses at the same time. The very nature of information and related technologies enables monopoly formation. The market value (and hence competitive advantage) of proprietary data and knowledge depends on the right to collect them and prevent others from having them.

Firms in information technology (IT) industries or IT-transformed industries can maintain their technological and informational advantages in many ways, including intellectual property protection and barriers to entry that stem from scale economies flowing from first-mover advantage and network effects in a digitally

²² For example, since the late nineteenth century, US laws and anti-trust policies have separated "infrastructural platforms," e.g., railroads, banks, TV stations and networks, from ownership of commercial firms dependent on such platforms. Khan 2019 argues that a similar approach is needed for digital platforms.

connected world.²³ Once successful, they can maintain their dominant position by limiting technological change, by acquiring smaller competitors with superior or disruptive technologies, or by suppressing their external and/or independent development. Over time, additional strata of related innovations can provide a defensive moat around the initial innovation that allowed firms to develop at scale. Such buffers can take various forms, including layers of trade secrets, ongoing software updates and transformation of the firm into a platform for services (Khan 2018b).

As information technology develops and transforms more industries, market concentration and power are rising. The resulting monopoly profits have worsened wealth and income inequality and increased the political and social lobbying power of corporations.²⁴ The concurrent rise in leverage means that lenders or bondholders are providing an increasing fraction of the funding for non-financial firms. As Kurz (2017) shows, leverage in US corporations (debt as a ratio of capital employed) increased from 22 percent in 1960 to 78 percent in 2015.

The income created by monopoly firms can be divided into labour wages, normal interest on debt and monopoly profits. With rising monopoly and monopsony power, firms have had the ability to charge higher prices and provide lower compensation to workers. As a result, monopoly profits have grown at the expense of labour income and the owners of competitively provided capital, lowering the share of income delivered in wages and interest. As information technology has transformed more sectors, wealth and income inequality have increased as monopoly profits have gone to equity, which is narrowly held. Rising monopoly power may also explain the slower rate of private investment and lower production capacity.

Technology is a fundamental driver of the structure of human societies. New information and digital technologies have improved economic efficiency in many ways and created the potential for greater individual agency and social welfare, but the increase in market power and dominance for a few has been detrimental to the rewards and nature of work for the many. Changes in economic structure, often aided by government policies or the lack thereof, are having a profound effect on the labour market. Technology has made just-in-time matching of demand and supply, monitoring of performance and payments possible. This has produced an ‘unbundling’ of work and organizations, greater labour market fragmentation and the ‘gigification’ of work where stable salaried employment is less important and financial precarity increases.

Wages have not kept up with productivity; the share of output going to labour is declining.²⁵ Wage stagnation is not uniformly distributed across workers, however. The wages of less educated workers have declined or

²³ See, for example, Kurz 2017 and 2018, and Hearn and Meagher 2022. Ekerdt and Wu 2022 suggest that industry concentration has increased since specialized firms have displaced more diversified manufacturing corporations, with the shift in demand towards specialized, higher-quality products.

²⁴ See, for example, Lynn 2010, Khan 2018a, Tepper and Hearn 2019, Philippon 2021, and Hearn and Meagher 2022.

²⁵ See, for example, Taylor and Ömer 2020, and Eeckhout 2021.

remained flat in inflation-adjusted terms while those for highly educated or skilled workers have increased. While the returns to education and the importance of abstract knowledge and skills have become more important, the cost of education has risen and is becoming a hurdle even for middle-class families.

Much of wage inequality is driven by differences across firms (Song et al. 2019, Eeckhout 2021). Skilled workers are concentrated in certain firms where returns to education and social networks are high, whereas many firms provide routine, menial and lower-paid support services. The overall labour share has fallen as the high earnings of the educated minority do not offset the lower earnings of the majority. Both business and labour dynamism have declined with fewer new businesses being formed and lower labour mobility across jobs and geography.

Market power, and its carryover to the political realm, have united to stymie efforts by governments to redress the imbalances in economic and social power, so much so that in the transition to a digital economy, democracy itself seems threatened even in advanced economies (Teachout and Khan 2014). The impression created for many voters is that democracies as currently constituted are only functioning well for the rich and powerful (Hacker and Pierson 2010, Zingales 2012).

The supervision of old markets and the development of new markets in the digital age may require prescriptive rules and the monitoring of outcomes. This is likely to entail the development of metrics for assessing the proper functioning of markets and the acceptable range of outcomes. For example, outcomes that lead to the poisoning of the public square or widen the misalignment of social and private interests may require a much quicker rethinking of governance mechanisms and recalibration of policy and regulation.

Market governance needs to evolve

Governing market forces for the public interest has been challenging enough but new technologies have put the problems on steroids. The core asset in the digital age is information, which by its nature will require a different sort of cooperation between the State, private players and civil society to address complex questions of privacy, copyright, security and access. Governance will likely need to be more varied, transparent, inclusive and essential to the very existence of markets. And the functioning, stability and sustainability of the economic system will require complementary regulations in many areas, including defining digital products and services, communications, antitrust and finance.

The contract between the producer of digital products and the retail consumer is always likely to be ‘incomplete’ because the contractual arrangements are complicated and hard to fully understand, and the risks difficult to evaluate. Caveat emptor in the digital age may not be easily feasible. It is impossible for the individual consumer to gauge data security and comprehend complicated agreements every time a digital product or service (e.g., website, payment provider) is used. Can the collection of data be controlled or filtered

or monitored in digital products? Who owns the raw data? What about processed data? How do you determine the boundaries between raw and processed data? What should be the consequences for the firm if data security is breached? If data are a key asset, what are their properties as collateral? Can collected data be monetized or transferred if the firm goes bankrupt? What kind of barrier to entry do accumulated data pose for the contestability of markets? Uniform rules are unlikely to work since much will depend on the nature of the data and the digital service or product.

Industries transformed by digital technologies are raising questions with which the law has not fully grappled before. Should platform firms be allowed to exploit or sell private information collected when clients use their services? Should the law allow firms to acquire new IT innovations to suppress them or overrun the competition? How should anti-trust policy be reformulated for the digital age (Khan and Vaheesan 2017)? How should the free speech boundaries set by society apply to media platforms when they intermediate falsehoods?

As the economic structure transitions into a new technological era, the regulatory framework needs to change and adapt.²⁶ Digital platforms and other information-based enterprises may require the legal creation of new commercial entities and the evolution of company and commercial laws to address issues related to (a) data openness and availability, (b) interoperability, (c) preventing these entities from usurping the roles that should be played by the political system and the State in democratic societies, and (d) the distribution of corporate income among various stakeholders.²⁷

New markets?

The challenge of governing markets in the Anthropocene extends well beyond regulating tech firms and their economic and social impacts. Nature and its underlying physical processes are immune to human prevarication. The scientific consensus tells us that time is running short and environmental tipping points are upon us.²⁸ And our current production systems are simply not well set up for large-scale speedy resource reallocation to preempt emergent systemic problems posed by extreme environmental shocks coupled with economic and social inequalities.

To date, the business and financial communities have responded with minor tweaks, largely in the form of environmental, social and governance (ESG) practices and metrics. But although the sums now invested in ESG funds have skyrocketed, what counts as ESG includes anything that can claim any sort of social or environmental purpose, with often meaningless accountability measures. At best, the ESG approach leads to a

²⁶ Kurz 2017 and 2018, Fukuyama 2021, Henderson 2021, and Hearn and Meagher 2022.

²⁷ Mazzucato 2014 elucidates the fundamental role that state institutions play in the innovation ecosystem and in taking on the risks of modern capitalism, for which they are often not compensated adequately.

²⁸ Wallace-Wells 2019, Armstrong McKay et al. 2022 and Kemp et. al. 2022.

bit of reduction in the harmful environmental and social externalities of existing business practices. That is nice, but it is not a foundation for the necessary systemic transformation.

A significant step beyond the ESG approach is the idea that business should focus on multiple purposes, not just financial returns. Such ‘purpose-driven’ firms may set out to solve a specific societal problem using a for-profit model that provides the financial stability needed for the organization, or they may aim to balance financial, environmental/natural and/or social capital returns across all of their activities.²⁹ New legal forms in most US states and a rapidly growing number of countries around the world enable firms to register as for-benefit or for-purpose, signalling to investors that short-term financial returns will not be the sole metric used for business decisions, even as many argue that long-term financial returns are actually better with business models that do not attempt to dump costs on the rest of society.

Perhaps most challenging are the efforts to create whole purpose-driven markets, not just individual firms. For example, the experimental carbon offset markets, and more generally, the emerging markets in nature-based services, put a price on a benefit that nature has always to date provided for free—such as sequestering carbon in forests or seagrasses, protecting shorelines via mangroves, or cleaning water in, for example, the New York City watershed, thus saving the city billions of dollars of costly construction. The sellers are whoever has a property right in that ecosystem. Buyers of such ecosystem services are generally countries or companies that have made voluntary commitments to offset current or past greenhouse gas emissions or have some incentive to bolster nature. But far too often, neither buyer nor seller does the due diligence to ensure that the public purpose is actually achieved; carbon offset markets in particular have been riddled with abuses. Still to be worked out are all the complications of defining the product, the nature of the contracts, the provision of information, monitoring and dispute settlement procedures in ways that ensure that the purpose is honoured.³⁰

It seems unlikely that normal market development will deliver on the public purposes of greenhouse gas mitigation and nature protection. Decarbonization may require several top-down schemes to incentivize change in complex economies: (a) price-based approaches that put a cost on carbon and use other forms of taxes and subsidies; (b) a regulatory approach that favours credit provision for green assets, and phases out certain inputs and production processes, including through prohibitions on certain activities; and (c) direct public investment. All these approaches—and more—will have to be used to cajole the system to respond, in what Castle and Hendry (2021) call an “integrated symbiotic strategy” that overcomes the siloed approaches currently preventing societies from moving into virtuous cycles that achieve net-zero greenhouse gas emissions.

²⁹ Mayer and Roche, eds. 2021, and Roche and Jakub 2017.

³⁰ See, for example, Florini et al. 2022 and Berzhagi et al. 2022.

CIVIL SOCIETY AND THE DECLINE OF TRUST AND SOCIAL CAPITAL

Three forces bind democracies together: shared stories, social capital and strong institutions. All are under siege around the world, with devastating consequences. Inequalities of wealth, income and opportunities, and the extreme pressures and precarity of modern life for many people, are combining to rip societies apart. Societies that lack a degree of cohesion and a set of shared values find it difficult to address problems that threaten human development. Political and social polarization undermine the legitimacy of democratically elected governments and reduce citizen compliance with laws that should apply to all. Equally important, the lack of public trust prevents the kind of self-organization within and across communities needed for localities and larger societies to adapt flexibly to uncertainty and volatility and to generate bottom-up change.

Social media has contributed to weakening all three forces. It has added to the spread of false information, amplified political division, and dissolved the mortar of trust, belief in institutions and a shared history (Putnam 2020, Haidt 2022). Social platforms give more voice to extreme opinions than to moderate majorities, and mob justice on the Internet tramples democratic and nuanced discourse (Applebaum 2021). Distributed networks as currently constituted seem good for disputing and toppling but not for achieving shared goals or addressing collective problems—in other words, for governing.

For civil society, which lacks the coercive power of governments and the resources available to firms, the source of collective action is social capital, the capacity to act together based on trust. There are competing definitions in the corpus of social capital research but the most useful and broadly applicable comes from Robert Putnam, for whom social capital refers to “features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit” (Putnam 1995, p. 67, Pinto 2006). Societies that are rich in social capital are better able to generate collective action in all forms: Governments need to use less coercion, market contracts need less onerous provisions and enforcement, and most importantly, people can self-organize to do everything from singing together to protecting their local environment. That self-organization is based on persuasion and norms, not formal authority.

Since Alexis de Tocqueville’s study of the United States, the relationship between social capital and a healthy, responsive democracy has been well documented, both theoretically and empirically.³¹ Social capital lubricates civil protest and other forms of civic engagement that can challenge vested interests and power structures that perpetuate harmful status quos.

Social capital also enables economic development. Economists point to the positive externalities generated by social networks and norms, such as knowledge and the capacity for collective action itself (Collier 2002). Studies show that a country’s level of interpersonal trust, measured in the World Values Survey as the degree to which

³¹ See, for example, Tocqueville 1815, Paxton 2002 and Krishna 2012.

respondents agree with the statement that “most people can be trusted,” has a positive correlation with per capita gross domestic product.³² Conversely, countries with high levels of income inequality report low levels of trust. In his classic *Bowling Alone*, Putnam (2000) draws a straight line between the economic decline of American cities and the disappearance of voluntary associations such as bowling leagues.

Moreover, certain kinds of social capital, such as economic connectedness, cohesiveness and civic engagement, can alleviate the growing inequality that so threatens our societies. A recent study drawing on data from about 21 billion Facebook friendships showed that communities with strong ‘bridges’ between high- and low-income strata saw much greater economic mobility for children from low-income families. Such bridges can be built by policies and appropriate urban planning, so there is a major role for governance, although people must still choose to walk across the bridges (Chetty et al. 2022a, 2022b).

Researchers have also demonstrated that social capital is critical for resilience, making it essential for withstanding and adapting to shocks. In the aftermath of natural disasters, communities that have the highest survival rates and that recover more quickly and completely are those that have well-developed ‘social infrastructure’, that is, dense and strong social networks at the community level.³³ The strength of social infrastructure is the single-best predictor of resilience, more important than emergency services capacity or physical infrastructure such as levees (Aldrich and Meyer 2014).

All these findings indicate that sustainable human development requires large amounts of social capital to withstand the shocks of the Anthropocene. Yet tectonic disruptions to social networks and changing norms are eroding social capital and thus the ability of citizens to mobilize collective action. There are several drivers of this trend, but clearly a key one is technology.

As the review in the previous section reveals, the rise of the Internet and information technology platforms confounds our standard regulatory tools. Beyond that, they have profound implications for social connection and collective action. Initially, the Internet promised a new age of connection and mobilization. Mass movements of pro-democratic civil unrest in Iran (2009–2010), Tunisia (2010–2011), Egypt (2011) and other Arab States relied on social media platforms such as Facebook and Twitter. The platforms enabled protesters to share information and organize actions outside the reach of the State. At the time, the Internet and social media platforms were heralded as tools of democracy.

Social media does enable rapid mobilization but “with this speed comes weakness,” as the sociologist Zeynep Tufekci writes. For one, “the ease with which current social movements form often fails to signal an organizing capacity powerful enough to threaten those in authority” (Tufekci 2017, p. 71). Fragility also comes from the

³² See the World Values Survey database at www.worldvaluessurvey.org/wvs.jsp.

³³ Beggs, Haines and Hurlburt 1996; Aldrich 2010, 2011 and 2012; and Aldrich and Meyer 2014.

fact that the nature of connections made spontaneously over the Internet is different from those developed over time through face-to-face interaction. Weak ties, such as those between casual acquaintances or ‘Facebook friends’, are useful for sourcing new information or mobilizing large, disparate groups across society (Granovetter 1976). But these ties are, well, weak. In the face of sustained opposition or government crackdown, they tend to crumble. When it comes to following through on risky acts and maintaining sustained action in the face of danger, strong ties—the relationships characterized by frequent and deep interaction, such as those between family members or close friends—are better (Della Porta 1995). They evoke mutual accountability and reciprocity. Activist movements built on strong ties, such as the civil rights movement in the United States, are more likely to have the longevity and fortitude to succeed (Gladwell 2010). That social media is now the primary vector for activist organizing and for a greater share of social relationships, generally, represents a weakening of connections that makes collective action in the face of resistance more difficult.

The Internet and new information technologies are now being wielded by dictators and quasi-autocrats to control and repress their populations. Internet-based and artificial intelligence-powered surveillance tools enable governments to monitor their populations more pervasively, less intrusively and at lower cost than ever before (Kendall-Taylor, Frantz and Wright 2020). Some regimes weaponize social media, mobilizing armies of online supporters to shift public opinion and attack opponents and dissidents, which can result in real-world violence (Ressa 2016). As a result, these ‘digital autocracies’ may prove more durable than their analogue predecessors (Kendall-Taylor, Frantz and Wright 2020).

Technology is weakening social capital and deterring societal collective action in democracies as well. Researchers have found that social trust decreases with online interactions (Sabatini and Sarracino 2014). The Internet-driven fracturing of the mass media landscape, the rise of alternative and conspiracy-based news organizations, and the relative decline of rigorous, high-integrity journalism organizations as filters and gatekeepers of information have exacerbated polarization and the proliferation of disinformation, which makes society-wide collective action less possible.

The consequences are severe. Vested interests such as fossil fuel corporations have exploited the fractured information environment to deter public action on climate change (Oreskes and Conway 2010). Countries with polarized media landscapes were less able to maintain trust in public health institutions and implement effective responses to the COVID-19 pandemic, resulting in untold numbers of needless deaths (Morris 2020).

In addition, the new economic order that Shoshana Zuboff calls “surveillance capitalism,” in which companies mine human experience as the “free raw material for hidden commercial practices of extraction, prediction, and sales” (p. v) and the traditional relationships between producers, consumers and employees no longer apply, is reshaping social participation and eroding the “organic reciprocities” that existed between people and economic institutions. As mentioned in the section on market governance, social engagement on digital

platforms whose purpose is behaviour modification for revenue-generating prediction has eroded the “choice mechanisms that once adhered to the private realm,” limiting the exercise of voice and agency (Zuboff 2019a, 2019b). Inclusive economic institutions, such as those based on reciprocities between managers and workers, for instance, and that produce more equitable and developed societies, are essential for enabling social action that can level the playing field in society (Acemoglu and Robinson 2012).

Taken together, the reconfiguration of social networks, the erosion of trust and the undermining of societal relationships have weakened social capital and the ability of civil society globally to muster collective action. Combined with the inadequacies of traditional governmental approaches and the general misalignments of markets, all sectors face significant challenges in responding to the conditions of the twenty-first century.

What is to be done?

Four principles of governance for the Anthropocene

Governance for the public good under Anthropocene conditions requires finding practical ways to move humanity into a safe operating space between physical planetary boundaries that must not be crossed if civilization is to survive, and the equitable social foundation of basic rights and resources needed for prosperous, fair and stable societies (Raworth 2017). Bringing about and sustaining complex governance for the Anthropocene calls for four design principles. Although these principles are not widely embraced at present, we provide some examples that show how they can form the basis for new forms of governance that can help ensure the resilience and sustainable development of humanity in the twenty-first century. Governance based on these principles will be better able to experiment, respond quickly, draw on all relevant knowledge and account for the heterogeneity of societies, all while overcoming the power imbalances that entrench vested interests and building the trust needed for sustained collective action. Employing these principles will help to (re)build social capital at scale, create meaningful networks across decision silos, and develop layers of governance that keep decision-making as close to local knowledge as possible.

Such steps seem a far cry from the existing institutions of government, with their siloed bureaucracies, threatened revenues and legitimacy, and geographic restrictions. And private firms are in no better shape, facing great uncertainty about how they will be regulated, how they should respond to the changing terms of their social license to operate, and how volatile environmental conditions will affect everything from their supply chains to the health of their workforces. Civil society organizations are challenged by power imbalances and inadequate social capital.

Governance can and must be rethought and redesigned to meet the needs of the twenty-first century, to restore legitimacy and trust, to increase capacity for effective collective action, to make capitalist democracies

work for average citizens and to address systemic issues holistically. How? By revising institutions based on four principles of Anthropocene-ready governance: (a) systemic rather than siloed analysis and decision-making, (b) transparency, (c) inclusion and (d) individual-level capacity and agency-enabling effective subsidiarity.

SYSTEMIC THINKING

Perhaps the single most important change that Anthropocene governance requires is the shift to thinking of whole systems, not isolated issues and organizations. As noted earlier in the discussion on complex systems, decision-makers facing such situations must focus not only on the behaviour of individual components and actors, but equally on their interactions and relationships, including with those in other systems. But what does that look like in practice?

To start, decision-makers must see States and markets as symbiotic and co-evolving within a complex system, recognizing that both influence the emergent dynamics of the system as a whole. Market design reflects choices made by legislatures and regulators, and as markets evolve in terms of products, production processes, organizational incentives and societal expectations, suitable modifications in regulation and oversight become necessary to achieve social goals.

The ‘free and perfect market ideal’ distorts our thinking about the relationships between States and markets. Hiding behind the rhetoric are normative judgements implying that such an ‘ideal’ is the appropriate objective for society and should not be hampered by other considerations; that reality should be explained as a deviation from this ideal, however impossible the attainment of such perfection may be in practice; and that any role of the State in the creation of markets is an ‘interference’, rather than a required part of the design for the existence and functioning of modern markets.

The words ‘markets’ and ‘freedom’ are often juxtaposed to create the impression that government rules are an ‘interference’ or ‘intervention’ or ‘distortion’ that unnecessarily constrain ‘freedom’. Freedom from what, for what purpose and for whom is generally left vague and unspecified. The implication is that the government distorts the allocation of resources, and that government involvement is a ‘second-best’ solution to normally pristine and efficient markets that arise from the natural order of things.

In reality, the design of all markets is a public-private partnership to attain societal objectives. A rigid private versus State dichotomy is not useful in the context of a systemic approach to governance. Rather, we should examine the shifting nature of this co-partnership in establishing and supporting markets for private and social benefits. Similarly, ‘market failure’ and ‘government failure’ can be deceptive and misleading terms in the sense that such ‘failures’ are considered anomalies that need correcting, and that governance is needed only to remedy or correct ‘market failures’, rather than for the very existence and functioning of modern markets.

The breakdown or malfunctioning of modern markets is generally due to both market and government failures in the design, regulation, oversight and formulation of policies.

In democracies, the political process determines what society values. It is crucial to ensure that the process is not captured by powerful interest groups. And in some democracies, for example, the United States, we do see the beginning of a pushback against excessive concentration of power. Today, efforts are being made to remove regulations that favour the wealthy and powerful, improve the bargaining power of labour and other stakeholders, enhance the representation of women and labour on corporate boards, and put in place incentives to prevent the destruction of nature.

Frameworks for implementation

Once we get beyond the false States/markets dichotomy, how can we foster systemic thinking in national and global governance? There are practical steps to take, using planning processes that consider the larger system and its adaptive, complex nature (Meadows 2008).

First, decision-makers can begin by mapping the system using social or organizational network analysis (Yang, Keller and Zhang 2017). Such mapping affords a better understanding of the stakeholders and the connections between them, and how changes might affect them. It also helps afford a view of the entire system in which a particular outcome is embedded.

As a concrete example, in the early 2010s, the Netherlands, despite having some of the highest levels of health-care spending in the world, had some of the worst perinatal health outcomes in the European Union. After mapping where outcomes were worst, policymakers realized that the problem was not access to health care but rather widening inequality driven by social and educational disparities. Recognizing that poor perinatal health results from a complex system and that a simple, technical fix like improved access to health facilities would not solve the problem, they built what they called ‘local coalitions’ of health and social services providers to support and treat poor women who were pregnant or had recently given birth. Within a few years, the coalition approach had become embedded in most of the country (Schreiber 2022).

Sri Lanka’s community-based turtle conservation project is an example from a developing country. The Sri Lankan coast is a nesting ground for five (of seven) sea turtle species, which are important keystone species that contribute significantly to maintaining the marine ecological balance and serve as a gauge for monitoring environmental changes. Until recently, turtles in Sri Lanka were under threat because locals and poachers killed them for their meat and eggs. The local population was merely harvesting ‘natural resources’ for consumption and sale but their activities were devastating sea turtle populations. The Government worked with the United Nations and environmental and charitable organizations to develop an approach that is altering the trade-offs for the local population. An ecotourism strategy uses community-based incentives to protect the sea turtles

from poaching. Volunteers and tourists flock to the coastline to watch the turtles lay their eggs in the safety of protected beaches. This has boosted the local coastal economy, and communities now see it as in their interest to protect the turtles and safeguard the turtle breeding areas (United Nations 2012, Rathnayake et al. 2016).

Second, the uncertainty inherent in a complex system means policies and programmes can easily produce unintended consequences or be affected by emergent conditions that conventional policymaking tools do not readily capture. The use of tools such as scenario-based planning allows planners to consider and plan for a variety of alternative outcomes and conditions that might arise from a given policy or programme (Mason 1994). Policy analysis combines assumptions and data to draw conclusions. For given data, strong assumptions lead to strong conclusions but these tend to be less credible. Hence, communicating ambiguity and the range of possible outcomes in policy analysis is essential (Manski 2019).

Third, during implementation, just as feedback loops drive a complex system to constantly adapt, so too must the governance of a policy, programme or investment incorporate feedback and adjust to the new reality of the system. That means conducting ongoing monitoring, evaluation and impact assessment. A variety of new standards for measuring and assessing impact include the impact investing world's Impact Rate of Return and the Social Progress Index, a proxy for measuring progress on the Sustainable Development Goals (SDGs) (Foley 2018, Social Progress Imperative 2022). New technologies make the real-time collection and processing of evaluation data both feasible and affordable at scale. Several private groups, both for-profit and non-profit, have developed apps, phone-bank systems and other techniques to monitor social impacts and engage local communities around a wide range of projects (Florini et al. 2022).

All this is challenging enough within the scope of authority of existing polities. But when governance is needed to cross the boundaries of polities or sectors, few organizations have the capability to directly govern other actors that are crucial to achieving systemwide goals or mitigating risks.

Cross-sector collaborations

One rapidly spreading social innovation that holds promise for creating broader governance is found in cross-sector collaborations that bring together all three main types of social organization: governments, for-profit firms and civil society. Such collaborations, called everything from public-private partnerships (PPPs) to multistakeholder initiatives, take a wide variety of forms. Most familiar are infrastructure PPPs, which ostensibly tap private sector efficiency in the construction and often operation of major infrastructure. But in such PPPs, authority is clearly retained by the government partner, to whom the private sector sells its services.

The kinds of collaborations relevant to this paper go far beyond such contractual arrangements or the conventional 'consultations' governments have with constituents and civil society organizations. In collaborative governance, some combination of government, business and civil society groups (at least two of

the three sectors) works together to create public value in a defined issue area (Florini 2019). Authority and decision-making discretion are shared among the parties (Donahue and Zeckhauser 2011). Such arrangements might feature overlapping jurisdictions and multi-actor alliances that include government agencies, legislative and judicial bodies, private industry, civil society and/or non-governmental organizations (NGOs) (Renn, Klinke and van Asselt 2011). Any one of the sectors, or even individual policy entrepreneurs, can take the lead in creating such hybrid entities.

Collaborative governance arrangements can occur at any level: local, national or cross-border, from the management of Central Park in New York City to the dizzying array of businesses and civil society organizations that now contribute to global problem-solving.³⁴ The activity of this wide range of global actors is starting to be integrated into international governance with, in some cases, dramatic positive effects (Madsen and Christensen 2016). For instance, Gavi, the Vaccine Alliance, brings together philanthropic investment and partnerships with governments, businesses, research institutions and other civil society organizations to deliver immunizations on a global scale. From 2000 to 2019, Gavi vaccinated more than 888 million children against communicable diseases (Gavi 2022). During the pandemic, it led delivery of COVID-19 vaccines to developing nations under the COVID-19 Vaccines Global Access (COVAX) facility.

Cross-sector collaborations have been growing for decades, driven by concerns in all three sectors. National governments and intergovernmental organizations concerned with development have been incorporating partnership ideas for decades; indeed, the 2002 World Summit on Sustainable Development became known as the ‘partnership summit’ for its emphasis on collaboration. Civil society organizations, increasingly troubled by government failures in addressing the big issues, have worked both through such processes and directly with private firms on quite a large scale.

Many firms have found it worthwhile to engage. In an era of rising societal expectations and worsening planetary crises, the creation of public value holds increasing resonance for private firms. In addition to traditional business rationales for engagement (to have a voice in shaping the rules and to manage reputational risk), more and more firms are claiming to recognize that their very business models are threatened by the failure to date to manage the world’s physical and social systems well. But they often find that changing their business models to accord with the demands of society and the Anthropocene requires working closely with other sectors to figure out what to do, and how (Florini 2019).

Collaborative governance has emerged as a widely accepted adaptive response to the need for flexible collective action to manage human systems in the Anthropocene. And to this end, 2015 was a breakthrough year on two fronts. First, the 2015 Paris climate agreement explicitly connected a host of collaborative climate

³⁴ Donahue and Zeckhauser 2011, Slaughter 2017, and LaForge and Slaughter 2021.

endeavours and is implicitly the centrepiece of many more. Second, global agreement on the SDGs capped decades of steady shifting by the development community towards collaborative governance for development, from the call in Agenda 21 encouraging the active involvement of NGOs and businesses to the Johannesburg ‘partnership summit’. The SDGs explicitly call for collaborative governance as a key mechanism to achieve the goals, with part of the final goal being an endorsement of public-private and civil society partnerships as means.

But collaborative governance can easily fail to create public value at all, as happened with many of the partnerships associated with the Johannesburg summit (Pattberg and Widenberg 2016). Often lauded for their inclusivity, collaborative arrangements all too often simply replicate existing patterns of power and exclusion, frequently in the guise of efficiency (Pouliot and Therien 2018). The explicit terms of reference for collaborative governance should include transparency, inclusion and ensuring that in focusing on a given issue, collaborations pay heed to the larger system in which it is embedded.

Those who are designing collaborative mechanisms to bring about large-scale change and systemic transformation need to consider the universe of such mechanisms as a system in itself. They need to shape the vast increase in the number of collaborative governance arrangements so that it leads to an emergent order rather than chaotic fragmentation (Florini 2019). To this end, it is useful to examine alternative paths for institutional evolution and to look at where political and social capital is being formed or could be created to bridge separate initiatives.

Institutional evolution and experimentation

While there is increasing recognition among private corporations about the social responsibility of business, if for-profit firms are still largely designed around and for the generation of financial capital to benefit a select group of funders, cross-sector collaboration can only go so far. Rather than only continuing to plead with and incentivize the private sector to serve the broader public interest, it is time to explore other institutional paths that combine public and private elements to achieve better societal outcomes. Among other considerations, during a climate crisis, time is of the essence.

Mazzucato (2014) makes a convincing case (with a plethora of examples) for the State as an entrepreneur, risk-taker and creator, and not just as a ‘market-fixer’ for externalities and a passive investor in research and development. Most new fundamental technologies require risk-taking by the State and its capacity to bring together technical expertise and long-term funding. Public resources and policy can also catalyse private initiatives by reducing the uncertainty of investing in new products and enabling commercialization.

The Washington Consensus marginalized the State, seeing it as a mechanism for creating private markets for private capital. The current ‘Wall Street Consensus’ places global finance at the centre of the development process and sees the State as a fiscal backstop that guarantees returns to private capital (Gabor 2021). The

private sector is encouraged to build, manage and finance public goods while the State reduces the risk of doing so. This is seen as a method of attracting private finance for infrastructure and achieving other development objectives. Whether such risk reduction can be effectively managed and integrated into the development strategies of rich and/or poor countries at scale and with the required speed to orchestrate a green and just transition in the digital age remains an open question.

In the aftermath of the global financial crisis, and more recently the COVID-19 pandemic, national development banks and other state-owned agencies are being discussed as vehicles for taking a systemic approach to closing public infrastructure gaps and for more broadly orchestrating a nature-friendly transition to renewable sources of energy.³⁵ The case for such approaches and agencies rests on the inability of the private sector alone to bring together simultaneously a constellation of initiatives that may be needed for success, and/or the unwillingness of the private sector to enter into activities that provide public benefits and unleash positive externalities but involve long gestation lags and uncertain returns.

This discussion is taking place even in advanced countries with developed markets. Hockett and Omarova (2018), for example, propose the creation of a US National Investment Authority to practically address the large-scale allocation of resources and investments necessary for the creation and reconstruction of infrastructure, for building capacity in select emerging and key industries, and for pursuing a green transition, which by definition is systemic and complex, involving multiple sectoral, geographical and public policy objectives that are not easily addressed by current governance structures.³⁶

The National Investment Authority would be a new kind of institutional and legal entity that influences and participates in capital markets and serves as a coordinating mechanism for investment in public and social infrastructure that requires long-term horizons, patient finance and substantial risk-bearing ability. It would be endowed with multiple modalities for coordinating between the public and private sectors by combining a National Infrastructure Bank for debt finance and a National Capital Management Corporation for equity funding of projects. The authority would be self-funded after a nascent phase and would have the advantages of access to central bank liquidity and a Treasury credit line to allow flexibility in managing long-term financing of public interest projects. A board comprising multiple stakeholders would provide oversight while being subject to a system of checks and balances to guarantee good governance for internal competition and innovation, and to provide democratic accountability.

The National Investment Authority would essentially be a publicly owned enterprise and asset manager for harnessing public and private capital for public projects and reshaping associated markets. The question is whether such an agency can be successful in combining the advantages of public funding and guarantees with

³⁵ See, for example, Griffith-Jones and Ocampo 2017, Musacchio et al. 2017, UNCTAD 2017 and Riaño et al. 2021.

³⁶ Omarova (2022) provides a detailed institutional blueprint.

the operational and productive capabilities of the private sector at the scale needed. Much would depend on the political support it receives and the details of a governance structure that embraces transparency, inclusiveness and an empowering subsidiarity (EURODAD 2017, Omarova 2022).

A somewhat less ambitious plan is to create an organization called the US National Reconstruction and Development Council that does for public goods and infrastructure what the US Financial Stability Oversight Council does for financial stability and the National Security Council does for security issues (Hockett 2021). The National Reconstruction and Development Council would bring together existing federal entities with jurisdiction over relevant industries and infrastructure to develop a national strategy, coordinate and facilitate public and private funding, and oversee the creation and management of public assets. The Federal Reserve and the Treasury would jointly lead it to produce a long-term development strategy and a vision for the nation's infrastructure and key industries. Two reconfigurations would be involved: first, broadening the remit of the Federal Financing Bank, a semi-autonomous entity within the Treasury, from extending loans and loan guarantees to federal agencies to also taking equity stakes and making other investments, and creating special purpose trusts that bring together public and private money for public undertakings; and second, resuscitating the development role of regional Federal Reserve banks by having them foster emerging industries and start-up firms for public interest projects.

Another proposal, by Farooqui and Sahay (2021), calls for creating a US public ratings agency insulated from public and private institutions that would serve as a quality control filter for economically viable projects contributing to decarbonization and resilience against climate change. Private and public funding combined with government guarantees would be given only to projects that meet the climate and social objectives of sustainable development. Currently, the sifting of projects and their green categorization is done by multiple government agencies (in their domains or jurisdictions) and large private asset managers.

The European Commission has been working on a sustainable finance taxonomy but has come in for criticism as the 'green and sustainable' standards have been diluted due to powerful industry pushback. As Daniela Gabor (2021) and Dafermos, Gabor and Michell (2021) contend, it is impossible to take the politics out of identifying sustainable activities and ratings. Defining a green standard will be difficult without scaling back the power of private finance. For cutting greenhouse gas emissions, we not only have to find methods to promote green projects but also must counter industry pressure and speed up the reduction in funding for polluting, carbon-intensive industries. And this must be achieved globally.

International and national laws and agreements could assist in accelerating the green transition. In a landmark case brought by a Dutch non-profit, Urgenda, and 866 citizens, the District Court of the Hague ruled on 24 June 2015 that the State of the Netherlands was acting unlawfully by taking insufficient measures to limit the emission of greenhouse gases. The judge directed the Dutch Government to reduce greenhouse gas emissions

in the Netherlands by at least 25 percent by 2020. Roger Cox, the litigator for the plaintiff, argued that the 165 signatory countries of the 1992 United Nations Framework Convention on Climate Change were legally compelled to reduce greenhouse gases in the atmosphere to a level that would prevent “dangerous anthropogenic interference” in the planet’s ecosystems that would endanger human communities dependent on those ecosystems and ultimately humankind itself. He asserted that this global behaviour and the Dutch contribution posed a threat to the effective enjoyment of human rights (Cox 2014).

In 2015, the Paris climate summit more sharply defined the threshold for danger when 195 nations agreed to strive to limit the temperature increase to 1.5 degrees Celsius above pre-industrial levels. In May 2021, acting on behalf of Friends of the Earth Netherlands and others (Shearman and Sterling 2021), Roger Cox won a ruling against Royal Dutch Shell that requires the energy company to cut its carbon dioxide emissions by at least 45 percent net by 2030 compared to 2019 levels. The key assertions in this case were: (a) there was incontrovertible evidence that warming beyond 1.5 degrees Celsius will have dire and irreversible consequences for the planet and endanger human rights, and any corporation that ignores that is doing so consciously; (b) corporations have a responsibility to ‘a legal duty of care’ to reduce carbon dioxide emissions wherever they occur; (c) the reduction includes emissions from a corporation’s entire global value chain (Scope 1, 2 and 3 as classified by the World Resources Institute protocol); and (d) corporations have a responsibility to protect human rights even if the State is negligent. Pending an appeal by Shell, the decision is provisionally enforceable. While the Shell decision was taken under Dutch law, it cited international treaties and ‘soft law’, including the UN Guiding Principles on Business and Human Rights, for determining Shell’s carbon reduction obligations. It hence has implications for approaches that may be used in other countries for compelling corporate action to address the environmental crisis.³⁷

Governance by orchestration

To ensure that such a proposal for systemic governance creates institutions capable of dealing with complexity, we can envision them not as centralized governors but as orchestrators—platforms that support and facilitate the work of many others in a network of institutions. Orchestration involves one organization, an orchestrator, enlisting and supporting intermediaries that can govern a third actor or set of actors. Unlike in a hierarchy or another direct governance arrangement, such as delegation, an orchestrator has no firm control over the intermediaries but instead “creates, supports, and integrates a multi-actor system of soft and indirect governance geared toward shared goals that neither orchestrator nor intermediaries could achieve on their own” (Abbott et al. 2012, p. 3).

³⁷ See, for example, Shearman and Sterling 2021.

Examples of governance by orchestration abound. In public health, the World Health Organization (WHO) enlisted the Gates Foundation and various other intermediaries from the private and non-profit sectors to fund and implement programmes such as Roll Back Malaria and Stop TB. More recently, the WHO, the Coalition for Epidemic Preparedness Innovations (CEPI) and Gavi have jointly orchestrated a network of companies, funders and supporting organizations under the COVAX facility, delivering billions of COVID-19 vaccine doses worldwide. In environmental policy, one of the major innovations of the Paris Agreement was for the process under the United Nations Framework Convention on Climate Change to formally embrace as intermediaries the thousands of climate action initiatives and partnerships undertaken by non-state and subnational actors (Hale 2016).

There is an opportunity for more organizations to use orchestration to achieve systemic goals. In the fight against climate change, intergovernmental organizations are the most frequent orchestrators and NGOs the most frequent intermediaries but there is growing potential for businesses to play one of those two roles. For instance, the Integrity Council for the Voluntary Carbon Market is a private sector initiative that seeks to orchestrate the various private and non-profit players that develop, verify and issue carbon credits to make sure corporations with net-zero pledges purchase and trade high-integrity offsets that remove greenhouse gas emissions from the atmosphere (Integrity Council for the Voluntary Carbon Market 2022). Intergovernmental organizations such as bodies of the United Nations could lead hubs focused on specific problems or SDGs that bring together the wide range of actors working on that goal or problem (LaForge and Slaughter 2021).

This can be expanded to orchestrate system transformation rather than specific problem-solving. The United Nations Secretary-General, for example, has committed the United Nations Food and Agriculture Organization to jointly lead a coordination hub that will bring together actors working on food system sustainability to coordinate information-sharing and set implementation priorities, potentially the core of a system transformation (United Nations 2021).

Education

Although systems-minded governance is emerging in bits and pieces, there are far too few people able and willing to lead such governance. This is not surprising, since educators at all levels have drummed systemic thinking out of people from childhood. To have systemically minded governance operate at scale will require not just acceptance of key design principles and the availability of collaborative mechanisms but also significant and rapid changes in how policymakers, business leaders, activists and orchestrators of all stripes are educated. Since the Enlightenment, Western education has embraced a reductionist view of the world, based on rational analysis of cause and effect, breaking systems into small, digestible pieces, and identifying individual technical solutions to problems.

The modern interdisciplinary study of systems dates to the early twentieth century. More recently, a new generation of systems theorists has founded research centres, such as the MIT System Dynamics group and the Santa Fe Institute. A few programmes have set out to transform professional education (Florini 2018). Despite these academic enclaves, mainstream education worldwide remains predominantly siloed by discipline and reductionist in its pedagogy.

There is a compelling need to overhaul primary and tertiary education for the Anthropocene. The complex systems institutes and courses emerging throughout academia are mostly at the post-graduate level and mostly not directed at decision-makers. Students worldwide should gain the capacity to rigorously interrogate the future, a basic understanding of feedback loops and planetary cycles, and the ability to perform the constant experimentation and revision needed to grasp and manage wicked problems.

TRANSPARENCY AND INFORMATION

Transparency in governance is often discussed in moral terms for a democracy: The governed have the right to know what their governors are up to in their name. But a useful definition of transparency in governance also refers to its utility, the degree to which information is available to outside stakeholders and enables them to have an informed voice in decisions, and/or to assess the decisions made by insiders as the first step towards accountability (Florini 2003/2005). That can include information gathered through technological means, information proactively disclosed by choice or regulation, and information that outsiders can request from insiders. Meaningful transparency provides adequate feedback channels on how well policies and experiments are working and what adaptations are needed. Such feedback builds confidence across societies that participating in collective action is neither futile nor self-defeating.³⁸

In the next section on inclusion, we discuss how and why to bolster the range and diversity of voices in decision-making and implementation. Here we focus on why transparency needs to be a core principle of governance in the Anthropocene and how to achieve it.

The ‘why’ is clear from both theory and experience. Evidence from governance in multiple realms demonstrates that, with due respect for information that truly must be secret, transparency makes it possible for more eyes to spot problems, for trust and reassurance to replace undue suspicion, and for governors to learn lessons. And of course, governors who claim to be responsive to their citizens need to provide at least some windows into the policy process.

Over the past few decades, the struggle over transparency has seen significant change. After a slow start in the mid-twentieth century with a handful of freedom of information laws, most notably in the United States, for a

³⁸ Manski 2019 cautions against reporting policy analysis with certitude and sacrificing credibility to obtain strong conclusions. He encourages communicating uncertainty in policy analysis and warns against conflating science and advocacy.

while it seemed that governmental transparency was sweeping the world. Starting in the 1990s, India and South Africa adopted the world's most far-reaching national freedom of information laws, China promulgated national right-to-information regulations, and scores of countries experimented with opening up once-secretive governmental decision-making (Florini 2007; Florini, Lai and Tan 2012). But such opening up is far from entrenched, as revealed during the COVID-19 pandemic, when governments around the world used pandemic necessity as an excuse for imposing severe restrictions on the right to know (Hart and Steward-Streng 2021).

The environmental realm has seen particularly significant use of transparency and disclosure in governance. This started in the 1980s with the Bhopal disaster, when a Union Carbide facility exploded in India, killing thousands and injuring many more. The resulting attention to the hundreds of thousands of synthetic chemicals in widespread use (almost entirely untested for health or environmental impacts) helped lead to a new law in the United States, the Emergency Planning and Community Right to Know Act. Under this law, companies are required to report to the US Environmental Protection Agency (EPA) on the quantities of hundreds of toxic chemicals that they release into the air or water or onto land. The EPA's resulting Toxics Releases Inventory is a public document.

But such 'regulation by revelation' is not, in itself, adequate (Florini 1998). The information being revealed must be comprehensible to those who have incentives and capacities to act on it—that is, to complete the 'action cycle' of disclosure-based governance (Fung, Graham and Weil 2007). Under these conditions, by distributing the monitoring task of collective action, transparency enables a wide range of stakeholders to nudge systems in more desirable directions, which was the next step in managing toxic chemicals. An NGO, the Environmental Defense Fund, launched a free online Chemical Scorecard designed to make the EPA's technical data understandable in terms of health and environmental impacts. The data were tied to rankings by county and state, zip codes and specific chemical facilities. Maps displayed schools and other community features and (given the era) the fax numbers of polluters' CEOs. Although other factors undoubtedly contributed, the Toxics Releases Inventory/Chemical Scorecard approach to regulation clearly had a significant impact. By 1994, emissions of the indexed chemicals at facilities covered by the law had fallen by 44 percent even as production of those chemicals rose 18 percent (Florini 2003/2005). Since then, transparency has become a key element of environmental governance around the world (Ramkumar and Petkova 2007).

Even in the national security realm, transparency arrangements have proved useful, indeed essential, in overcoming the security dilemma and enabling adversaries to manage crises in their relationships without resulting in war not wanted by either side. The 1980s and 1990s saw an extraordinary surge of transparency provisions in arms control agreements, going far beyond the toleration of spy satellite observation that had characterized earlier stages of superpower arms control. In the superpower relationship, that increase in

transparency contributed significantly to the peaceful resolution of the Cold War at a time when the dissolution of the Soviet Union posed great risks to international peace and stability (Florini 2002).

The expectation that governments had an obligation to allow other countries to verify their arms control claims soon extended beyond the US-Soviet bilateral relationship to cover virtually all countries in various agreements. The Chemical Weapons Convention, for example, has perhaps the most extensive verification procedures of any such treaty. Its parties must declare their chemical weapons holdings—which led India, for example, to declare in the 1990s that it had a previously unknown weapons programme—and all ‘precursor’ chemicals on their territories, even chemicals in the hands of private actors. The convention created the Organization for the Prohibition of Chemical Weapons with a permanent body of inspectors who regularly visit chemical facilities (private and public). Strikingly, the organization is authorized to conduct short-notice ‘challenge’ inspections on the territory of any party to the treaty.

The ‘how’ of transparency has become a bit easier to address with the advent of digital technologies, relatively inexpensive satellite data and the whole panoply of mechanisms for technologically facilitated intrusiveness. But as the examples above demonstrate, transparency is never solely a function of what outsiders can see for themselves. It always requires some release of information by insiders (Florini 1998). No satellite can see inside a file cabinet. Secrets may be harder to keep than they once were but transparency frequently remains a choice rather than an inevitability. That makes transparency a continuum of behaviours.

In short, the many rationales for greater transparency come from multiple perspectives, all of which apply to good governance of and in the Anthropocene:

- **The people's right to know:** To achieve informed consent, information about practices and policies must be disclosed. In a shrinking world, where actions in one place have major impacts elsewhere, the people 'elsewhere' are entitled to know about and be asked to give informed consent to those actions. And given that communities everywhere will increasingly have to self-organize to respond to climate impacts, those communities will need access to information about what is coming their way.
- **Human rights:** Access to information is both a fundamental human right and a necessary concomitant of the realization of all other rights. Article 19 of the Universal Declaration of Human Rights asserts that freedom to speak on public issues is meaningless without the freedom to be informed.
- **Anti-corruption:** Shining a bright light can deter malfeasance.
- **Policy efficacy:** Transparency is essential to the feedback needed to find out how things are working in practice. Easy access to information is particularly essential when people in one part of the world are affected by policies and decisions made far away from them.

In addition, governing the Anthropocene is going to require all sorts of data that were not previously collected, on everything from details about ecosystems to the distributional consequences of economic policies. All these data will need to be integrated into a comprehensive picture of economic, political, environmental and social factors. And information systems will need the capacity to rapidly update those data and provide information to decision-makers in readily understood formats. The challenge is immense but exactly what the digital age should be able to accomplish.

There are, of course, potential downsides to transparency. Removing ambiguity can exacerbate conflicts, especially by putting public pressure on actors to respond to information they would rather ignore. There may be legitimate business strategy reasons for obscuring information in public documents. Transparency reveals behaviour but says nothing about the intentions behind that behaviour, and information can be misinterpreted or deliberately misused to imply that actors had intentions they did not in fact have. Finally, requiring disclosure can appear to be a sufficient step on its own, although it never is. That then removes pressures to take other steps needed to address the problem. The arms control arena provides a striking lesson here; the many agreements of the 1980s and 1990s that depended on and codified greatly enhanced transparency have largely collapsed.

Despite these concerns, the multiple rationales that underlie the broad principle of transparency are compelling arguments for why greater transparency is needed to enable flexible, adaptive governance in and

of the Anthropocene. The potential downsides mean that the principle needs to be implemented with reasonable care, but they are not sufficient grounds for secrecy in governance. Thus, the new technologies of transparency must be matched with the laws, regulations and norms that encourage or require disclosure. Only then will we have the depth of knowledge and widespread dispersal of valid information that is needed for adaptive governance of complex, volatile systems.

INCLUSION

The third governance principle is inclusivity. To cope with uncertainty and complexity and to generate the collective action needed to solve the problems of the Anthropocene, governance systems must incorporate the full range of perspectives relevant to those problems. That means expanding participation in governance to a wider array of stakeholders, whether individuals or organizations, and taking steps to ensure that their participation is meaningful. The history of political organization, political theory and experiments with inclusive ways of using digital technologies all indicate that such expansive inclusion is both necessary and possible.

Although evidence shows prehistoric societies experimented with a variety of political forms (Graeber and Wengrow 2021), for many generations, governance has usually been the purview of a small elite (Fukuyama 2012, 2015). Feudalism, autocracy, and colonialism concentrated political power in the hands of a few; wealthy families and scions of industries made markets and dictated the terms of finance; and participation in civil society was restricted to men of majority ethnic groups. Social movements and waves of decolonization and democratization in the second half of the twentieth century broadened participation in some countries, but sustained deconcentration of political, financial and social power has proved elusive.

New factors should make it possible to develop far more inclusive forms of governance. Although inequities persist, more people are now equipped with education and economic resources that should allow them to engage. With the economic and technological innovations of the late twentieth and early twenty-first centuries, hundreds of millions have escaped dire poverty and living standards have risen worldwide. The Internet and mobile phones have broadened access to information and enabled people everywhere to make their voices heard. All this has increased peoples' expectations that they should have a say in the decisions that affect their lives.

Yet while popular expectations have risen, in many parts of the world, people feel less able to meaningfully participate in existing political processes. According to International IDEA, an intergovernmental organization that works to strengthen representative democracy processes worldwide, global average voter turnout or the proportion of registered voters to the total vote has decreased significantly since the 1990s (Solijonov 2016). This decrease varies by region, and the causes of it are not clearly understood, but the fact remains that this most widely used instrument of meaningful political expression is in decline. The perception that political and economic institutions are failing to represent the will of the people is driving populism and distrust in existing

forms by which citizens can choose decision-makers and hold them accountable for their decisions (Mudde and Kaltwasser 2017).

Governance must now prioritize inclusivity for three reasons. First, inclusivity is necessary to narrow the power imbalances that may cause institutional ossification and dysfunction and generate resistance to adaptation. Voice is the starting point for power. If new coalitions are going to attain enough power to challenge the incumbent firms and other vested interests that stand in the way of systemic transformation, they will first need to be able to make their voices heard in existing governance processes. That means greater inclusivity.

Second, much of the task of governance in the Anthropocene is to find ways to adapt quickly to rapidly changing conditions that vary across localities. It has always been true that governance that relies excessively on top-down control by a small group will fail to gather the information needed to adapt and have the capacity to exercise oversight, even when trying to improve the human condition (Scott 1998). Network theory teaches that a network with a distributed structure is more resilient to shocks and disruptions than one with a centralized structure (Baran 1962).

But beyond this, governance that is insufficiently inclusive will not under the conditions of the Anthropocene be efficient much less effective. Claims that top-down, command and control organizations can deliver information, goods and other flows more quickly and reliably than a decentralized and inclusive network may sometimes be true. But under extreme volatility and uncertainty, exclusionary governance will not know what to respond to or where or what to deliver to whom (Pasqualetti et al. 2020). And it is not helpful for systems of governance to move faster if they are moving in the wrong direction because they lack adequate knowledge. Speed at making something happen does not necessarily mean effectiveness at achieving goals.

It has become well understood that in situations of complexity and uncertainty, a team of diverse members is better at problem-solving, innovating and making accurate predictions than one of more homogeneous members (Page 2019). Diversity encompasses not only ethnic or racial differences but also cognitive diversity, which is, among other things, a function of educational and experiential background. People with different bases of knowledge and experience bring different information and viewpoints to a problem. Governing bodies that include diverse perspectives will be better at anticipating, understanding and responding to unexpected changes and developments.

Greater inclusion also fosters greater legitimacy. Numerous studies citing examples from around the world have shown that public service delivery improves when civic input is properly incorporated into the design and management of a programme (Open Government Partnership 2018). Policies that include a wide range of stakeholders in some stages of their inception are more likely to be implemented with fidelity and permanence.

Since participation cultivates a sense of ownership and trust, stakeholders will be more committed to a programme and its benefits over the long-term.

International development and capital projects in developing countries provide powerful lessons about the importance of inclusive participation in the governance of such projects, as seen particularly in extractive industries and nature-based solutions such as reforestation. When local communities and indigenous persons affected by a project have meaningful agency and voice in the governance system at every phase of a project's lifecycle, they can provide on-the-ground monitoring that can affirm the suitability, quality and longevity of development projects. And when they do not, they can ensure that the project fails. Voice and empowerment are not only a moral imperative but also a practical necessity.

That means not only consulting with these communities but also giving them seats on governing bodies so that they have real power as well as access to grievance redress mechanisms that are accessible, fair, transparent and predictable. Local community engagement must have power behind it to be effective. A meta-analysis of the research on the impact of social accountability measures in general found that bottom-up monitoring and community oversight are likely to be “either ignored or squelched” unless community members have the backing of powerful allies or “counterparts to build countervailing power.” The conclusion: “Voice needs teeth to have bite—but teeth may not bite without voice” (Fox 2015, p. 357).

Democratic societies, despite being warned for decades by scientists, have not yet taken appropriate actions against an emergent climate crisis. The destruction of nature is only beginning to appear on the political list of priorities.³⁹ Now it is too late to depend on top-down action alone. Societies will have to facilitate bottom-up change at scale, that is, rapid and revolutionary changes in norms of behaviour, to produce large-scale effects for addressing the systemwide challenges posed by the climate and nature crisis (Kupers 2020).

SUBSIDIARITY

In complex systems, local adaptivity to unexpected changes is crucial because there is no way to accurately predict specifically what is coming, even if we know the general outline, as we are seeing with climate impacts (Fattore and Vittadini 2021). Subsidiarity is thus a key principle for creating resilience in a multi-layered governance structure. According to the principle of subsidiarity, which gained wide attention as a core tenet of European integration (Laschi 2021), “social and political issues should be dealt with at the most immediate level consistent with their most adequate resolution” (Arato, Cohen and von Busekist 2018, p. 47). Higher-level central authority should only step in when an issue cannot be dealt with by a more local authority. Procedural mechanisms hold together the structure and functionality of the governance process, including the collection

³⁹ The outcome of the December 2022 Conference of the Parties (COP-15) of the Biodiversity Convention provided a roadmap and goals that are a major step forward, but implementation remains a question mark.

and transmission of data, and use of available resources and expertise to address the problems at the lowest level feasible, with some overlap and redundancy facilitating experimentation and social learning.

If practised well, governance based on subsidiarity can bolster the legitimacy of governing bodies. Local authorities tend to be physically closer, more visible and more connected to the people they serve. And for many issues, local governance is more effective. Local authorities can be more attentive to their constituents' needs and interests, more aware of relevant conditions and nimbler in the face of changing circumstances. In the words of two political theorists, "In a world with diverse communities with differing needs, desires, cultures and histories, subsidiarity promises both better outcomes and better institutional legitimacy" (Blake and Gilman 2021).

Institutional structures, modes of credible communication, and autonomy are likely to differ across countries and depend on historical and cultural factors and the political and legal authority in different jurisdictions: local, communal, townships, regional and other subnational entities. The ability to cope and react to emergent issues is determined by the totality of resources and their distribution, including tax revenues, expertise and available policy instruments. Designing for subsidiarity is no easy challenge (Fox 2015).

But it can be made to work. A huge array of examples shows that local communities can govern common pool resources more sustainably and resiliently than a leviathan-like authority. Contrary to the orthodoxy that centralized, external control is the only way to avert the tragedy of the commons, collective, self-organizing, local-level governance arrangements have been effective for irrigation and rice farming in Bali, watershed management in the Andes Mountains, lobster fishing in Maine and countless other common pool resources.⁴⁰

In Viet Nam, for example, which is frequently hit with natural disasters such as typhoons and floods, subsidiarity is the basis of the country's emergency response doctrine (Joint Advocacy Network Initiative 2010). When a disaster occurs, the most local level possible is responsible for responding; if support is needed, it appeals to higher levels of government for assistance and resources. This doctrine was used in the country's response to COVID-19 outbreaks and was part of the reason that Viet Nam, despite being a lower middle-income nation with relatively few resources, was one of the most effective nations in the world in containing COVID-19 (LaForge 2021).

⁴⁰ Hardin 1968, Ostrom 1990, Lansing and Kremer 1993, Wilson 1993 and Recharte 2017.

Conclusion

Societies need peace, resilience and an ability to experiment with governance in uncertain times. Without peace it is hard to imagine creating the trust and cooperation to address systemic challenges. What is needed is not just the absence of violence but what Killelea (2020) calls “positive peace,” in which norms, beliefs and preferences make violence less tolerated and institutions more responsive to societal and global needs, and underpin formal and informal structures that support the non-violent resolution of grievances.

This paper has argued that if we want a world of positive peace and human flourishing for the long term, how we conceptualize and practice governance needs to change radically.

Twenty-first century governance cannot rely solely on existing institutions and practices. Governments cannot merely regulate polluting ‘externalities’ when environmental disruption is changing entire planetary systems. Dysfunctional political and corporate governance has been the root cause of the world’s deepening climate emergency. For decades, vested interests, especially in the energy sector, have used their power to delay the remedial and transformative actions called for by a strong scientific consensus on the environmental effects of our energy and production systems. If we continue to respond weakly to the scientific warnings of climate disruption and ecosystem devastation, countries will be ravaged by heat, floods and famine, and further debilitated.

Nor can governments and societies rely on standard tools to manage the digital economy’s massive assault on privacy and the public square, or the inequalities to which the digital transformation of commerce and commercial entities have contributed. IT-derived monopoly power is an important explanation for the twin problems of slower output growth and worsening income and wealth distribution, which in turn have undermined social and political norms of behaviour and are threatening democracy itself. Economic growth does not solve these problems. As Scheidel (2017) points out, there is no persuasive evidence to corroborate the view that modern economic development, as such, narrows inequalities within societies. Historically, inequality has been compressed significantly only by war, revolution, pandemics and State failure. A reassessment of how markets and legal institutions divide the fruits of technical advances is necessary.

Yet just while all these factors threaten to halt and even reverse what had seemed for decades to be a positive trajectory of human development, political divisiveness, inequality and social dislocation, driven in part by technology, are weakening humanity’s ability to collectively respond. The discordance in the relationship between private and public sectors has led to a decline in trust of political and economic institutions, an erosion of democratic norms and societal polarization. The symbiotic relationship between the public and private spheres that had previously fostered representative democracy and prosperity has become antagonistic and impaired. As the pandemic has shown, systemic shocks placed most of the burden on the young, the poor and

those with little agency. The pandemic experience does not bode well. Globally and within countries, what collective action we can muster may disappear under stress, creating adverse political, economic and social dynamics that lead to chaos and instability.

The tragedy of our situation is thus: At the very moment we most need collective action at the local, national and global levels, our ability to muster it is diminished. Societies with power imbalances, low social trust and polarized citizenries will find it difficult to: (a) repair the public square and the divided media landscape; (b) experiment with policies and institutional structures and processes; (c) negotiate the trade-offs that span different realms and horizons; (d) address the distributional consequences of technological and structural change; and (e) foster cooperation across national boundaries.

There are ways to do better. As this paper argues, we are facing complex challenges and the need to transform complex systems—but, fortunately, not chaotic ones. In complex systems, patterns do emerge and can be deliberately shaped. Bringing order out of complexity happens through some combination of self-organization, centralized control and market incentives. We need to experiment with strategies, tools and approaches for collectively making and implementing decisions. The typical divisions that have characterized our governance regimes can and must yield to stronger and more effective collaborations between the private sector, civil society, and a better functioning and well-resourced State. These should work to elicit people's preferences and objectives through an array of democratic processes, foster human development, build both collective and individual agency, and strive to achieve the common good.

To successfully manage the coming volatility and evolve with the challenges posed, these governance arrangements will have to be based on the principles laid out in this paper—systemic thinking, transparency, inclusion and subsidiarity. As we have argued, we need ways of realizing broad agreement on shared goals that work better than our current electoral representative and market-incentive systems. And we need ways of achieving those goals. The four principles, in combination, provide the foundation for both.

The four principles must work together to create truly systemic governance. For example, the subsidiarity principle leaves great discretion to a wide range of actors, who must organize themselves in ways that simultaneously work for local purposes and leave localities able to interact effectively with those elsewhere, all while everyone is facing the incessant shocks of the Anthropocene. Doing so requires the legitimacy and information flows that the transparency and inclusion principles provide, which in turn depend on systemic thinking to know what information to gather, how to provide it, who to include in what kinds of decisions and the implementation of those decisions, and how to include them effectively. There may be trade-offs, although the conventional wisdom of an inherent trade-off between inclusion and efficiency usually reflects poor governance design more than a truly inherent conflict.

The tools we have suggested for implementing the principles are all crucial—the use of scenarios for planning, institutional innovations from cross-sector collaborations to new types of public development banks, tech tools to include and empower a much wider range of voices, and legal and normative changes to support for-purpose and new models for business and markets. And these are just some of the many options for rethinking governance for the Anthropocene (Le Prestre 2018).

Redesigning governance needs to consider not just organizations and institutions but also the roles of individuals. In a world faced with widespread precarity in capitalist democracies and the suppression of individual liberties in authoritarian States, Sen's (1999) characterization of human development as the expansion of basic freedoms is even more apt and immediate. Individual agency increases the capacity of citizens to fend for themselves and to participate in the political, economic and social processes that not only affect their personal well-being but also contribute to societal resilience. Transparency, inclusion and subsidiarity can help in unleashing behavioural contagion that spawns rapid and sweeping changes and hence aids in bringing about systemic change. Context and situation affect individual decision-making; individual decisions in turn provide feedback and have a collective effect on shaping the context and environment.⁴¹ Since behavioural externalities can be a powerful social force, any steps that alter situational perceptions have the potential to change individual preferences and social customs quickly. For example, behavioural contagion can affect many choices that influence greenhouse gas emissions, such as the size and nature of houses we live in, the automobiles we drive and the foods we consume.

Of the four principles for twenty-first century governance, the least operationalized to date is the most important—the systemic approach to what are, after all, systemic problems. Leaders, bureaucrats, citizens and policymakers must think and act systemically. They must embrace uncertainty, which means adopting policies and strategies that are robust in the face of many alternative futures. They must continually assess and adapt their approaches as systems change and new information emerges. Most importantly, they must take a holistic view, which means focusing not just on the behaviour of the individual components and actors in one system but also on their interactions and relationships with those in other systems.

By intention, we define these governing principles broadly, because a feature of complex systems is that one size will not fit all. But if adopted as guiding principles, they have the potential to shift our governance systems toward greater adaptability, to strengthen trust and to improve humanity's chances of sustainable prosperity in the Anthropocene.

⁴¹ Frank 2020. Towards creating the right perspectives, Ghosh (2016) argues for better employing the humanities and our cultural and historical narratives to improve understanding of the implications of planetary climate change and hence our collective ability to respond appropriately.

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