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FIVE CORE DIMENSIONS OF PURPOSEFUL SYSTEM TRANSFORMATION

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ABSTRACT

System transformation is fundamental, broad, deep, and multi-scalar change that involves a paradigm change, i.e., a radical shift, in five key interrelated and interactive dimensions that constitute the whole of a “complexly wicked” socio-ecological system. This paper discusses these dimensions and provides a rationale for focusing on them. The dimensions are purpose(s), perspectives, and performance metrics. They provide an umbrella for the other two, power(s) relationships and dynamics, and the combination of practices, policies, and processes (practices for short) that characterize how a given socio-ecological system operates.

KEYWORDS

transformation dimensions, system transformation, paradigm shift, purpose, perspectives,
performance metrics

INTRODUCTION

The 2018 Intergovernmental Panel on Climate Change report (IPCC, 2018), Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (Díaz, Settele, & Brondizio, 2019), and a climate emergency report from more than 11,000 scientists (Ripple, Wolf, Newsome, Barnard, & Moomaw, 2020), among numerous other reports, articulate today's climate change, species extinction, and other sustainability issues pretty bluntly and urgently. They are systemic crises (for broad overviews see, e.g., Scrutton, 2020; World Economic Forum, 2020; WWF, 2018). Add in the global state of emergency caused by the COVID-19 pandemic with the attendant stress on interconnected healthcare, business, employment, and other social systems, and it is easy to see that today's economic systems as well as the broader ecological systems that support human civilization are in crisis.

The interconnections among these issues and the argument for socio-economic-ecological system (hereafter socio-ecological to recognize the embeddedness of human systems within the natural environment) transformation have been well rehearsed elsewhere (e.g., Pope Francis, 2015; Lovins, Wallis, Wijkman, & Fullerton, 2018). Raworth (2017), for one, building on the Stockholm Resilience Institute's planetary boundaries work (e.g., Steffen et al., 2018), argues that even as humans transgress ecosystem boundaries, too many of civilization's foundational social supports also face significant problems. Lovins et al. (2018), like many others, argue for system transformation away from today's economic system's emphasis on continual growth, privatizing everything, purportedly free markets (that are actually comprised of many oligopolies and even monopolies), maximization of financial wealth, and lack of attention to socio-ecological issues. The transformation, for many observers (e.g., Ehrenfeld & Hoffman, 2013; Eisler, 2017; Pope Francis, 2015; Lovins et al., 2018; Scrutton, 2020; World Economic Forum, 2020; WWF, 2018), needs to be towards a more equitable and ecologically flourishing world in the context of a renewed human relationship with nature that recognizes our embeddedness, connectedness, and interdependence—in short, wellbeing for all.

Current socio-ecological approaches create a situation for many societies that is demonstrably unstable. Looming and actual crises make one thing clear: there is a need for purposeful socio-ecological system (SES) transformation towards a world that works better for everyone and all beings on the planet. In what follows, we define transformational change in the context of complex adaptive systems

with wicked problems. Using a complex adaptive systems lens that recognizes the wickedness of most socio-ecological problems and following Waddock (2020), we then identify five core aspects of systems that we argue need to be considered by change makers to bring about purposeful system transformation.

A COMPLEXLY WICKED CONTEXT FOR PURPOSEFUL SYSTEM CHANGE

SEs exist in a context of complexity (e.g., Capra & Luisi, 2014; Geels, 2005; Geels et al., 2016; Loorbach, 2010; Rotmans & Loorbach, 2009; Stacey, 1995; Waddock, Meszoely, Waddell, & Dentoni, 2015). Further, they exhibit many so-called wicked problems (e.g., Churchman, 1967; Rittel & Webber, 1973) creating complexly wicked (or wickedly complex) contexts.

In complex wickedness, issues are dynamic, interrelated, and interdependent, and have no clear beginnings or endings (see Rittel & Webber, 1973). System change is a dynamically emergent process (Moore, Olsson, Nilsson, Rose, & Westley, 2018), which requires continuous constructive innovation at the institutional and system level to evolve in positive ways relative to environmental conditions. Simultaneously, there is a need to maintain and develop controls to keep the system from tipping to a point of collapse. This process, by the nature of complex wickedness, is neither predictable nor controllable once it begins (Waddock et al., 2015).

Perhaps an example will help ground these thoughts. During the COVID-19 crisis (ongoing as we write), the whole world (is experiencing) experienced what complexity theorists call a sudden state change. Diamond (2005) argues that the risk of such state changes, which happen suddenly in complex systems at the so-called edge of chaos (e.g., Kauffman, 1995), is system collapse. Within a period of weeks, some of the world's healthcare systems went from operating normally to being overwhelmed with whole countries and their economies being shut down. In the state where we are located in the United States, businesses shuttered, restaurants, theaters, bars, and other gathering places closed, layoffs happened, schools and universities shifted to online formats—all within a matter of days. Over a year later, most have not yet fully re-opened. Drastic isolation and physical distancing measures—applied holistically and systemically in parts of China and Italy—seemed to be one way to cope with the issue. Such measures, however, create untold and unpredictable ripple effects because of the complex nature of SEs.

As with COVID-19, wickedly complex problems like sustainability, climate change, healthcare, economic, and inequality crises (among others) need to be treated holistically, not piecemeal. Such issues evidence their deep embeddedness with multiple systems and exhibit characteristics of nonlinearity, interconnectedness, and unpredictability. With wicked problems, as with complexity, there is no clear “stopping rule” to indicate when to stop working on them (or, necessarily, where or how to start working on them). Like complex systems, wicked problems demonstrate sometimes fractal-like (self-similar at different levels) patterns and attractors. They also evidence path dependency, meaning that once a change begins, it is impossible to return to the original state. Thus, whether things could or would return to their pre-pandemic state was unknown—and unlikely. Too many things, some large and some small, will have shifted during the crisis (for conceptual background on complexity and wickedness see Batie, 2008; Churchman, 1967; Levin, Cashore, Bernstein, & Auld, 2012; Perey, 2014; Rittel & Webber, 1973; Waddock et al., 2015).

These combined characteristics mean that SES transformation processes cannot be planned or predicted. We argue that system transformations can and will need to be purposefully guided unlike the more ad hoc, sometimes chaotic, approaches evidenced in the COVID-19 episode. Transformation demands significant constructive innovation and action in all aspects of the system. There has been substantial attention in the literature on the complexity-based characteristics of systems (e.g., Fazey et al., 2018; Lissack & Letiche, 2002; Loorbach, 2010; Moore et al., 2018; E. P. Weber & Khademian, 2008; Westley et al., 2013).

BACKGROUND: 7S'S, COMPLEXITY, WICKEDNESS, AND SYSTEMS THINKING

Systems are highly-connected, integrated wholes that need to be conceived as wholes because when fragmented, they no longer function (Ackoff & Gharajedaghi, 1996; Backlund, 2000). Systems can, and often do, have subsystems that are themselves what Koestler (1968) called holons, whole other systems nested within other whole systems (subsystems), i.e., systems that are simultaneously whole and part of something bigger. For example, a tree is a whole and can also be conceived as nested within a forest or other ecosystem, a larger whole. When we think of transforming systems, we are conceiving of human systems—social, political, economic, civil society, communities, regions, nations, and the like, including the

relevant institutions that (as holons) comprise those bigger systems. It is important to recognize that all of these human systems are necessarily integrally interconnected to and interdependent with each other and, importantly, with natural systems or the broad ecosystem. Any human system is a holon with respect to a larger community, an ecosystem, and nature as a whole.

Purposeful transformational change, here focused on SESs, means humans taking considered actions to bring about depth, breadth, and complexity of change in whole systems with an eye towards future wellbeing for humans and nonhuman beings everywhere. In the present paper, we build on recent thinking about transforming businesses (Waddock, 2020), which develops a sense of what needs to change in system transformation. We also extrapolate here from thinking initially done in the 1970s by the consulting firm McKinsey, which built an organizational-level framework for diagnosing problems in organizations: the McKinsey 7S model or framework (Waterman, Peters, & Phillips, 1980).

Working at the organizational level, Waterman et al., (1980) implicitly recognized the systemic nature of organizations. At the time, it seemed that accomplishing organizational change should be a relatively simple matter of “structure follow[ing] strategy” (Waterman et al., 1980: 14), or at least some interaction between structure and strategy. Waterman et al. (1980), however, recognized that organizational change is actually a systems problem, though they did not use that lens for reasons explained below. They define the 7S framework as follows: “Our claim is that effective organizational change is really the relationship between structure, strategy, systems, style, skills, staff, and something we call superordinate goals” (Waterman et al., 1980: 17). In today’s terms, organizations are systems. To bring about organizational change, multiple aspects of the whole system need to (and will) change, not just strategy or structure.

Waterman et al. (1980) were writing in a context in which systems thinking, complexity/chaos, and wicked problems theories had yet to emerge in management and organizational scholarship, or, indeed, into the popular imagination. Thus, they could hardly have taken a complexity- or wicked-problems-based approach at the time. For example, Senge (1990) introduced and popularized systems thinking into the management literature a full ten years after Waterman et al.’s (1980) article introduced the 7S framework.

Further, complexity theory was just emerging in the scientific community and had not yet made the transition to popular thinking or management theory when Waterman and colleagues developed the 7S framework. Among the pioneering works to translate complexity theory for the non-natural scientist were Mandelbrot's (1983) *The Fractal Geometry of Nature*, Nicolis and Prigogine's (1989) *Exploring Complexity*, and Kauffman's (1995) *At Home in the Universe*. Gleick (1987) similarly popularized chaos theory with his seminal *Chaos: Making a New Science*. These pioneering authors made core ideas about complexity and chaos theory accessible. They helped foster greater understanding of complex adaptive systems that later began to be applied to management thinking by a number of forward-looking scholars (e.g., Anderson, 1999; Brown & Eisenhardt, 1997; Capra, 2005; McKelvey, 1999; Stacey, 1995; albeit see Beckhard & Harris, 1977; Hage & Aiken, 1970, who acknowledged that change was inherently complex, though without a complexity theory basis).

Similarly, the idea of wicked problems had been introduced in detail by Rittel and Webber (1973) less than a decade before the 7S framework. The first apparent mention and naming of wicked problems was by Churchman (1967) in an editorial referencing Rittel and Webber's work, which did not appear in print until 1973. Even today, though attention to the complex adaptive system nature of organizations and wickedness of socio-ecological problems has increased, it is still relatively rare to find those lenses used in mainstream management academic publications.

While Waterman et al. (1980) were talking about organizations as systems, they did not have the language of systems theory, complexity or chaos theory, or wicked problems that today we know to define the nature of SESs and their relationship to adaptability, resilience, and transformation (Walker, Holling, Carpenter, & Kinzig, 2004). They were also not focused, as this article is, on systems that encompassed multiple organizations, institutions, or other entities, like communities, societies, or economic systems, issues-based systems, or regions in their environmental context, all of which are part of the transformation agenda. The insights that Waterman et al. (1980) offered at the organization level, however, fostered the understanding that if organizations were to change, the whole organizational system, not just one or two aspects, was involved.

To support the development of our own framework, we briefly explore here the 7S framework in a bit more detail. Waterman et al. (1980) highlighted the importance of

seven interrelated aspects of organizational systems that shift during change efforts: structure, systems, style, staff, skills, strategy, and superordinate goals. By structure, they meant how organizational tasks are divided and coordinated, specialized and integrated, and centralized or decentralized. Waterman et al. (1980) defined strategy as “actions that a company plans in respect to anticipation of changes in its external environment” as a means of improving its competitive position (20). They used the word systems differently than we are using it, to mean formal and informal procedures that operationalize the work of the enterprise. By style they meant what today would likely be called organizational culture, particularly as applied to the management team, which had not yet been popularized as an area of scholarly interest in 1980. Staff meant people and how they are evaluated, as well as their motivation and the like. Skills characterize what companies do best and provide competitive advantage. Finally, Waterman et al. (1980) emphasized the importance of what they called superordinate goals or guiding concepts, aspirational goals, and values.

Waterman et al.’s framework provides a useful starting point. To it we add the seminal insights generated by Donella Meadows (1999) in her important paper “Leverage Points: Places to Intervene in a System.” Writing from a systems dynamics perspective, Meadows considerably enhanced understanding of how both socio-ecological, economic, and organizational systems change. She argued for 12 different leverage points in increasing order of effectiveness with constants, parameters, and numbers; buffers and stocks; stocks and flows; and other system characteristics including delays, feedback loops, and such as the least powerful. Meadows’ (1999) six most important levers are of particular interest to framing the dimensions on which transformation agents need to focus. Sixth most powerful is the “structure of information flows (who does and does not have access to information),” which is a resource and power dimension. Fifth is the “rules of the system,” another aspect of power. Fourth is the “power to add, change, evolve, or self-organize system structure.” Third most effective are the “goals of the system” or what we label as purpose below. Second is the “mindset or paradigm out of which the system—if its goals, structure, rules, delays, parameters—arises,” which we call the paradigm or perspectives. Most important of all, according to Meadows (1999), is the “power to transcend paradigms.” In what follows, we build on these ideas to develop a five-dimensional ‘star’ of change dimensions important to system transformation.

DIMENSIONS OF TRANSFORMATIVE SYSTEM CHANGE

We argue here following Waddock (2020) that transformation agents need to focus change efforts on five core dimensions of systems: purpose(s), perspectives/paradigms, performance metrics, powers, practices, with initial priority on the first three following Meadows (1999). Like Waterman et al.'s (1980) use of 7Ss, we use five Ps deliberately to aid memory (see Figure 1). In doing so, we have tried to provide a relatively simple framework for what is an inherently complex process.

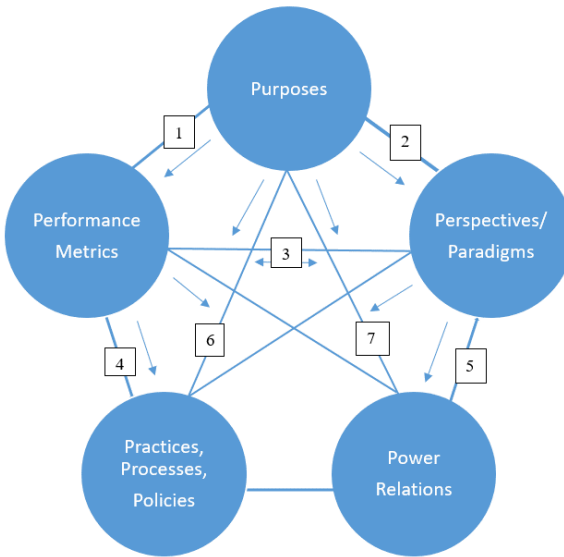


Figure 1: Change Dimensions of System Transformation – The Star of Transformation (Adapted from Waddock, 2020)

This constellation of five core dimensions of systemic transformational change shows the interrelationship among core dimensions of systems that need to be taken into consideration. All linked lines can be assumed to be bi-directional so that each element influences the others. However, the dominant directionality of influence is also shown by the small arrows. Although, purpose in a system strongly influences appropriate performance metrics as well as the perspectives or understandings of what the system is about by its participants (1 and 2). The triangle of purpose, perspectives, and performance metrics (1, 2, 3) are powerful levers for the rest of

the system because they deeply influence how practices (4, 6) and the structure or power relations (5, 7) are shaped.

Purpose(s)

Systems are defined in terms of their purpose(s), i.e., their reasons for existence (Ackoff & Gharajedaghi, 1996). Human systems tend to have purposes, sets of goals, aspirations, vision, mission, and values statements, and the like that articulate what they (at least in theory) do and stand for. Such statements guide their work, influencing what they do and how. Non-human systems, like the digestive system, also have purposes that are evident through their functioning. Ecological systems and other living beings, of course, are not able to articulate their purpose, but also serve a variety of purposes. Systems operating as wholes have integrity and, at minimum, an impulse towards survival. In other words, as A. Weber (2013) argues, living systems have intentionality, even when that intentionality is only to continue to exist.

One of the things transformation makers need to focus on is understanding and, if necessary, redefining the purpose(s) of systems to be transformed, because overarching purpose is what guides many activities in human systems. Articulated purposes are a form of guiding narrative in socio-ecological systems in that they define what a system is, what it stands for (i.e., its values), and what it does. Purpose statements are made up of what Blackmore (2000a, 2000b) calls memes or core units of culture, which can include words, phrases, brands, ideas, and symbols that collectively constitute vision, mission, important strategies, goals, and related signifiers. For many years, for example, businesses have been thought to have the (we believe mistaken) purpose of maximizing shareholder wealth (see Friedman, 1970). Waterman et al. (1980) recognized the importance of purpose with their idea of superordinate goals. Economies have taken on related goals of maximizing GDP growth and whole societies tend to similarly orient towards financial wealth, ignoring human embeddedness in its natural contexts. Meadows (1999) noted that the goals of a system were among the most powerful change levers. Korten (1984) further argued that organizations ought to exist to “serve the needs of people, while facilitating the human growth of all participants” (341), a position consistent with wellbeing for all, and which implicitly links the human enterprise to nature.

System transformation, as we see it, normatively needs to be a shift in purposes towards a broadly defined version of collective value absent dignity violations (or what we earlier called wellbeing for all), as defined by scholars Thomas Donaldson and James Walsh (2015). We add that purposes of human socio-ecological systems, including businesses, societies, and other institutions, should normatively benefit *all* living beings on the planet while greatly reducing harms. Such a purpose seems to be something on which many people could agree. It would provide an important overarching framework for transformation of social institutions including governments, NGOs, businesses, and other human institutions as Waterman et al. (1980) argued that superordinate goals would do for organizations.

Defining inspirational purposes is important to systems transformation because purposes articulate the aspirational intent of the system. Purposes need to do so in normatively acceptable ways, which inspire others to collaboratively or independently organize their own efforts in similar directions. In the context of complex wickedness, that is only the type of planning that has a chance of working. Purpose guides other aspects of transformation, which is why (re)defining a systems' purposes carefully is one of the core priorities of transformational efforts. Purpose in the form of aspirational vision creates the potential for coherence in human systems and institutions, and for transformation agents attempting to change such systems.

Purpose, perspectives/paradigms, and performance metrics discussed below provide a kind of umbrella of guidance for change makers that helps guide their otherwise possibly incoherent change efforts (see Figure 1 for these interrelationships). These three overarching and linked elements help provide focus around the difficulties of ensuring appropriate implementation of guiding purposes. Purpose is intimately linked with metrics that help support those purposes and shifting perspectives, paradigms, or mindsets that guide attitudes, actions, and behaviors. Thus, we look at these two dimensions of transformation next because these three Ps are tightly linked and can help support institutions in shifting towards broader purposes.

Perspectives/Paradigms

By perspectives/paradigms, we mean the mindsets and paradigms (Meadows, 1999) or mental models (Senge, 1990) of actors in the relevant system. Meadows (1999) argued that while system change could target technical levers like the

practices, processes, and technologies, the most powerful levers of change are the ones that influence the dominant mindset of actors in the system. What Meadows recognized is that most people have a certain understanding of what a given SES is and how it operates—that is, a perspective about it. To change the system, people will need to shift their mindsets (perspectives and the paradigms or mental models of what the world is like) or it is likely that insufficient change will take place. In other words, transformation changes the paradigm that shapes understandings of the systems in which we exist, how those systems operate, and what is important (or not), including relationships and connections. Their perspectives or paradigms help people align the operations of the system with purpose(s) and directionality implied by guiding narratives and their supporting memes (see Blackmore, 2000b; Waddock, 2018).

Shifting perspectives/paradigms, as with purpose, means working with narratives, stories, and, particularly, the memes (core ideas, words, phrases, images, and symbols) (Blackmore, 2000a, 2000b) out of which those stories are composed. Stories, as used here, discuss what the system is about, what it means to be part of it, and how it operates. As David Korten (2015) argued through the title of his book, if you “change the story” you can “change the future” and, arguably, the world or at least the system and understanding of its place in the broader world. Core stories and narratives are what anthropologists call cultural mythologies (Dow, 1986), which shape understanding of the world and how people see their place and power in the world. Even more importantly, Meadows (1999) added, is the ability of actors in the system to transcend whatever the current mindset or paradigm is. In doing so, they change the dominant narrative, core memes, and accept a new paradigm or understanding of what the system is and how it works. Meadows’ insight echoes Albert Einstein’s famous and oft-quoted statement, “We can’t solve problems by using the same kind of thinking we used when we created them.”

Performance Metrics

Crucially, transformation involves setting innovative and relevant (to desired ends) *performance metrics* at multiple levels and scales. Performance metrics include the important assessment and evaluation criteria for a system. Performance metrics are widely used to guide practices, shape perspectives, realign power relationships, and accomplish systemic purposes. When they are properly aligned and based

on the overarching purposes and goals of the system, such performance metrics help system participants understand how well the system is doing. When they are unaligned with purpose, they can provide incentives for misguided practices. One clear understanding in management (and accounting) practice is that you get the behavior you measure (and reward). Hence, it is important to identify the proper metrics or performance criteria associated with the outcomes that are actually desired, lest there be unintended consequences deriving from the metrics themselves.

Think about the evening news: every night there are reports on the stock market and GDP (gross domestic product), which imply that these metrics actually have something to do with peoples' everyday wellbeing. Yet, most people, at least in the US, do not own shares in the stock market and this attention to share price, along with CEO salaries tied to that metric, has resulted in ever-growing inequality in society. More importantly, flaws with GDP have been well known since its inception (e.g., Boarini & D'Ercole, 2013; Costanza, Hart, Talberth, & Posner, 2009; Eisler, 2017; Stiglitz, Fitoussi, & Durand, 2018). GDP assesses all economic activity as if it were neutral. What that orientation means is that negative impacts are as positive in GDP terms as are beneficial ones. Further, unpaid work, volunteering, and at-home care work (Eisler, 2008) are not counted in GDP. Additionally, devastating ecological and human practices (like clearcutting forests, strip mining, and massive layoffs) are positive with respect to GDP (e.g., Costanza et al., 2009; Stiglitz et al., 2018). GDP does not take human, societal, or ecological consequences of continual growth and profit maximization into account. Importantly, there is constant emphasis on continual growth of this flawed metric—an impossibility on a finite planet (Ehrenfeld & Hoffman, 2013). This type of flawed metric points whole societies (and the global community) in the wrong directions with respect to the core goals we identified at the outset: issues of equity, flourishing, and dignity for all.

In human systems, metrics deeply influence what is actually done in complex systems, because humans respond to the reward systems that metrics implicitly and explicitly generate. In a sense, purposes combined with metrics, which are necessarily interrelated, form bookends to the transformation process, influencing perspectives of system participants in important ways, and guiding their behaviors, attitudes, and practices. These three Ps provide good places to start the transformative process since people resonate with inspiring purpose and tend to align their actions to the metrics that will assess them once their perspectives have been influenced. Further,

these three, as Figure 1 illustrates with small arrows, are powerful influences on how practices and power relations evolve in a given context.

Power(s)

The distribution of *power(s)* in the system helps define the structural relationships and influence dynamics in the system, i.e., who benefits, who directs, who has information, authority, and resources or not, who has decision-making power and who does not, and the like. Power and politics are inevitable in any system, and power holders are often loath to give up their privilege, so it is important to understand power relations and dynamics and use these dynamics appropriately. System transformers need to understand who currently has power and how it is currently being used to hold the current system in place. Where can power(s), including resources, information flows, and status (c.f., Meadows, 1999; Waterman et al., 1980) be moved and how? Who wants power and how might their desires be leveraged? Who needs to be heard and who is not yet being heard? How can more voices be heard? Who is content to be in the background and who wants to be in the foreground? Levers for change can often be found in the context of understanding system power(s) and political dynamics, e.g., who are the leaders, elders, respected and privileged people, and other power players in a setting? What needs to happen to bring them into the transformation process, if that is possible at all?

Power is something that many change agents and scholars tend to (or want to) overlook. They prefer to focus on the emergence of the new rather than address the reality that transformation also involves the destruction of the old. The structural, hierarchical, and relational aspects of power need to be specifically understood and addressed before any system can be understood or transformed in a desired direction. That reality exists because in any given system, participants are multiple and success demands bringing the whole system into the room (Senge, 1990), including participants and voices not typically well-represented.

Further, there are likely to be multiple perspectives from different actors, so participants in any of these processes will bring needed breadth of vision as well as being open to a variety of possibilities for change. They also need to come willing to deal with a potential for conflicts that need resolution and recognize that different participants will become involved at different points in time and for different reasons with different agendas. The hard fact is that there are inevitably some very powerful

resistors to any change process who will not adopt the transformation perspective and must be marginalized (Geels, 2005) or find a role (Geels et al., 2016). That is the nature of transformational change.

Practices (Policies, Procedures, and Processes)

System transformation involves changes in key system (organizational, institutional, community, state, and so on) *practices, policies, procedures, and processes* or, simply, *practices* (e.g., Meadows, 1999). Practices are the activities through which systems accomplish their purposes either at the whole system level or in different subsystems of the whole. When they are effective, good practices, sometimes called operating practices, allow for efficiency, safety, and consistency (e.g., Law Insider, 2020). Purposeful transformation requires transforming practices to support changing definitions of systems and systems boundaries as a result of the deep change in purpose. Practices dictate what gets done and how it gets done in a socio-ecological system (or organization or institution).

Practices are often structured around organizational or geographic subsystems that are locked into traditional boundaries that themselves are the problem. For example, there are jurisdictional boundaries of nation states and within them that defy increasingly important trans-boundary issues like climate change and other environmental concerns. Also, practices tend to be structured around traditional issue or functional silos, each with their own characteristics of cultures, histories, and power structures. Good examples are government ministries and business functional lines. Transformation intimately involves crossing these traditional boundaries, which means practices must address characteristics of silos.

Practices, including policies at various levels, can be key leverage points for change (Meadows, 1999) when they are linked to purpose, perspectives, and/or performance metrics changes. Though as Kinzig et al. (2013) point out, shifting social norms is difficult and unpredictable. Policy (practice) change is often a focus to bring about significant shifts in behaviors of larger populations, in part because mandated policies apply to all and changes can establish new “rules of the game” that require actors to adhere to them. In transformation, challenges often require change in practices.

Four particular activities support transforming practices (K. M. Weber & Rohracher, 2012). The first activity is to develop processes of collective priority and

direction-setting. The second is the need to use or build coordinating mechanisms, perhaps better framed as coherence mechanisms. The third is to create demand-articulation, which refers to the need to create support for transformation. The fourth is reflexivity or reflection about the change and the need for it, which is deep assessment involving personal and objective sources of success and failure (K. M. Weber & Rohracher, 2012). Defining these new processes requires new configurations of stakeholders, an experimental stance, and third-order learning, which is learning that challenges deep assumptions, goals, and power (Schot & Steinmueller, 2018).

By generating a few key interventions and focusing on relevant practices, significant behavioral shifts can be made. Practices, however, shape behaviors explicitly, especially when they are well-designed, because in the form of rules and regulations, they have the coercive power of governments behind them and can mandate certain changes. Kinzig et al. (2013) identify four main types of policy instruments. First is active norms management, e.g., through advertising and information. Second is changing choice architecture or structures and norms that nudge people towards desirable and away from undesirable behaviors, e.g., through nudges as Thaler and Sunstein (2008) argue. Third is financial interventions like taxes, fines, allowances, and subsidies. Fourth is regulations including laws and mandatory (and sometimes voluntary) standards.

Norms and values shape practices and, ultimately, behaviors as well (Nyborg et al., 2016) in the process of what is known as cultural evolution (Ehrlich & Ehrlich, 2008). They let system participants know “how things work here” or what is acceptable and what is not, making the link to the core narratives, memes, and values discussed earlier. Further, people often use the idea of best practice as a guide to expected or exemplary behaviors as well, yet as Snowden and Boone (2007) argues, it is hard to talk about best practice in transformational work because you are actually working with “emergent practice.”

Developing and transforming practices requires creating virtuous cycles (e.g., Senge, 1990) because as Kinzig et al. (2013) note, “values influence behaviors. [And] what policymakers need to exploit is that behaviors can also influence values” (165). That is, because humans are social creatures, we are all influenced by what others are or are not doing, with only a small percentage (around 10% according to Kinzig et

al., 2013) of the population potentially needing to change to bring about a tipping point. These authors also note the importance of policies dealing with both short- and long-term shifts, not either one or the other.

DISCUSSION AND CONCLUSION

Transformation means developing new purposes, taking on new perspectives that involve creating new paradigms, measuring them in new ways through appropriate performance metrics, and then being willing to act with these new visions in mind. It is here that the meta-skill of systems understanding or systems thinking becomes so important, along with that of pattern recognition. A change agent—or participant in a system—needs to be able to see enough of the whole of the system, which is all five dimensions or Ps, to be able to act effectively. Transformation involves the ways in which key aspects of that system are interacting, what is influencing what, and what the patterns are that are constantly emergent in chaotic, complexly wicked systems. This ability to shift perspectives/paradigms can enable change agents to figure out what levers to pull (Meadows, 1999) or nudges to implement (Thaler & Sunstein, 2008) to bring about desired systemic change or at least change in the desired direction since transformational change is inherently unpredictable. The five Ps we have outlined can be helpful guides.

Focusing in on purposes can help with the other two umbrella leverage points—changing perspectives and performance metrics. There are multiple ways to shift perspective(s) and their associated paradigms, and generate systems understanding. One, we have noted already, is the scenario development process (Kahane, 2012; Sharpe, Hodgson, Leicester, Lyon, & Fazey, 2016; Wilkinson & Eidinow, 2008) that can help people envision alternative futures depending on which actions are taken. Another is to undertake mapping projects that help define the system, identify system boundaries, and provide identity to it, so that participants can actually begin to understand the system qua system, where the system is and is not functioning well, what needs to change, and where dysfunctions exist. Given the realities of complex wickedness, however, it is important to recognize that there will inevitably be many different perspectives on the definition, meaning, and potential pathways forward, perhaps as many as there are stakeholders.

Transformation agents need the perspective/paradigm, i.e., mindset, to be able to work with what Howard (2010) called *paradexity* or the combination of paradox and complexity. That perspective can help them understand the dynamics of complexity and wickedness as they affect large systems (Goldstein, Hazy, & Lichtenstein, 2010). Managing in complex wickedness inherently then means dealing reasonably well with ambiguity, having a certain dexterity of approaches, and undertaking collaborative interaction across sectors, organizations, and institutions, as well as across the nested levels of socio-ecological subsystems because change can actually begin anywhere in the system (e.g., Waddock et al., 2015).

The nature of complex wickedness implies that the system evolves through emergent processes. It means that change processes will be co-evolutionary and interdependent, possibly clustering around attractors of various kinds (Waddock et al., 2015), e.g., values, visions, power and resources, status, or any number of other possibilities that draw actors and resources toward them. Because transformational change is emergent, it cannot be predicted, and depends in part on dynamics of what has previously been done along with other forces present in the system. Transformation, given these system characteristics, is anything but linear (Johnson, 2007). These dynamics suggest approaching transformation not via planning or clear expected results, but rather through experimentation, nudging, nurturing emergent life-affirming developments, creating multiple paths (or multiplicity of efforts) towards similar ends, and being guided by shared purpose(s) as articulated above.

New performance metrics are also vital to achieving transformation, particularly at the societal level, to counter the narrowness of existing metrics like GDP (gross domestic product) in societies and shareholder wealth maximization in businesses (which usually manifests as share price for publicly-held businesses). For example, the OECD has developed what it calls a Better Living Index through its “How’s Life?” initiative (Boarini, Murtin, & Schreyer, 2015; Boarini & D’Ercole, 2013; Durand, 2015; Mizobuchi, 2014; Stiglitz et al., 2018) that attempts to develop a much more holistic assessment of wellbeing in different nations. Other possible broader metrics that get at issues of equity and general wellbeing, including the state of the natural environment, include the Genuine Progress Indicator (GPI)/Index of Sustainable Economic Welfare (ISEW) (see Lawn, 2003). Like purpose and perspectives, such metrics guide other behaviors manifested as practices and power distribution, which is the lower side of the star diagram in Figure 1.

Both challenges and opportunities globally make dramatically increasing capacity for purposeful transformation an imperative as the evolving COVID-19 pandemic (at this writing) makes clear. Without question, potential opportunities for positive change to emphasize purposes, paradigms/perspectives, and performance metrics associated with wellbeing for all do exist. The practices and power structures would arguably follow. The prospect of transformation, of course, is intimidating. The five dimensions of purposeful change (purposes, paradigms/perspectives, performance metrics, practices, and power distribution) point to ways to more strategically take action by emphasizing key dimensions that require attending to and constant assessment. Understanding human socio-ecological activities as systems means recognizing that doing something in one of the dimensions inevitably affects what is happening in the others, because they are all connected. Understanding this interconnected reality will go a long way to shifting mindsets, developing individuals' abilities, and creating the new organizations necessary to carry on the purposeful transformation agendas.

One common strategy to address power issues is to begin with organizing the early promoters of transformation, then to broaden to those of increasing hesitation. Though more time consuming than top-down attempts at change, by actively involving (representatives of) relevant actors, constituents, and interested parties in participatory processes shaping the agenda, and in designing and implementing changes, there is a far greater chance that transformational efforts will stick (Waddell, 2016). It is important to recognize that there is no one right way to accomplish this engagement, though there are a variety of approaches for doing so, including Three Horizons (Sharpe et al., 2016), Theory U processes (Scharmer, 2018), future search (Weisbord, Weisbord, & Janoff, 2000), open space technology (Owen, 2008), and appreciative inquiry (Cooperrider & Whitney, 2005) among others.

We recognize that the perspective shared here has limitations as the ideas are largely conceptual. They do reflect our own experiences in working with system transformers and initiatives over time. Other actors might frame these ideas quite differently and the reality of systems is that they are inherently complex, which means that identifying only five key aspects might well be an oversimplification. That said, we also think that because of that very complexity, providing key aspects of systems on which transformation agents can focus may well prove helpful in reducing some of the inherent complexity and providing pathways towards transformation.

Certainly, these dimensions should not be treated as silos, for as noted, they are interacting systems themselves that need to be treated as wholes in which all the different elements affect the rest of the system. This holistic nature creates the reality with which transformational change agents need to contend. Because transformational change represents a radical shifting of priorities, narratives, purposes, and perspectives, it means significant change for everyone in the system—including change agents themselves, who are inextricably part of the systems they are trying to change.

It is our hope that these five core dimensions of transformational change provide a holistic set of principles that enable transformational change agents to begin to understand the nature of the task(s) ahead of them and prepare for some of the issues they will inevitably face. There is, of course, much more that needs to be said in developing a full theory of transformational change. We hope that by outlining these core dimensions of change, we begin to provide a much-needed roadmap for change agents.

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