



Research

Wayfinder: a new generation of resilience practice

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ABSTRACT. Here, we introduce Wayfinder, a novel conceptual framework and a process design for resilience practice. Framed by the Anthropocene argument, and with an explicit social-ecological system focus, the purpose of Wayfinder is to help users navigate toward trajectories of sustainable development. We present the theoretical perspectives that underpin the Wayfinder framework, which draw together and synthesize multiple strands of contemporary resilience thinking. We also describe how we operationalize this framework through an action-oriented process that is designed to facilitate transformative change on the ground. Wayfinder's contribution to resilience theory and practice emerges from the combination of: (1) framing that enables users to address the complex sustainability challenges that we face today, (2) synthesis of recent key advances in resilience science into one comprehensive framework and process, (3) practical guidance that moves beyond an assessment of the current state of affairs and provides concrete advice for planning and action, and (4) emphasis on learning as a key mode of operation in the rapidly changing Anthropocene.

Key Words: *Anthropocene; complexity; participatory approach; resilience assessment; resilience practice; social-ecological systems*

INTRODUCTION

A growing body of evidence suggests that the Earth has moved into a new geological era: the Anthropocene, or the age of humans (Crutzen 2002, Waters et al. 2016). We live in a globalized and hyperconnected world, where humans have become the dominant force of change on the planet (Steffen et al. 2015). As popularly expressed by Rockström and Klum (2015): over the past 70 years, we have gone from being a small world on a big planet, to becoming a big world on a small planet.

The immense economic and technological development the world has seen over this period of time has clearly enabled better lives for many people. At the same time, 600 million people still live under extreme poverty, global income inequality is increasing (United Nations Development Programme 2019), and we face severe problems associated with the excessive use of natural resources, loss of biological diversity, pollution, and accelerating climate change (Foley et al. 2005, Millennium Ecosystem Assessment 2005, Rockström et al. 2009, Steffen et al. 2018). To address these global challenges and to be able to seize emerging new opportunities for development, it is clear that the quest for sustainability must permeate decision-making from now on in all sectors and at all levels.

Since the early 2000s, resilience thinking has matured into a frontier of sustainability science, which has greatly improved the understanding of how dynamic change unfolds in intertwined social-ecological systems (Folke 2006, 2016). We identify three insights emerging from this broad field of scholarship that are of fundamental importance for addressing contemporary sustainability challenges. The first insight is that approaches to sustainable development in the 21st century must explicitly address complexity, which is a key feature of the Anthropocene (Reyers et al. 2018). As the world becomes increasingly connected, development prospects in one part of the world are intimately connected to what is happening elsewhere. Distant places influence each other through so called teleconnections, as interacting environmental, social, and economic processes generate cascading change across space and time, often with surprising unintended consequences (Liu et al. 2013, 2015,

Österblom et al. 2017). These cross-scale connections are apparent in phenomena such as deforestation in the Amazon driven by urbanization and food imports in China (Liu 2014), and political unrest in the Middle East being exacerbated by drought and failing cereal harvests in central Asia (Sternberg 2012). In this context, approaches to sustainable development must assume uncertainty, rather than stability, and move beyond a local-scale focus to be relevant (Reid et al. 2010, Bai et al. 2016).

The second insight is that sustainable development practice must take its starting point in a social-ecological systems perspective that recognizes the fundamental role that the biosphere plays for societal and economic development (Chapin et al. 2010, Fischer et al. 2015, Folke et al. 2016). There are no people who do not have a direct or indirect need for ecosystems and the services they provide (Millennium Ecosystem Assessment 2005, Folke et al. 2010). Thus, we must reconcile the right to a good life for all with the facts that current consumption rates require far more resources than the world produces, and we have already passed a number of critical limits for the Earth system (Rockström et al. 2009, Steffen et al. 2015). This situation means that sustainable development practice must facilitate development trajectories that respect both social and planetary boundaries (Raworth 2012, Leach et al. 2013).

The third key insight is that adaptive, incremental change will not be enough to solve many of the deeply entrenched problems that we now face. Instead, sustainable development practice must aim to achieve transformative change (Leach et al. 2012, Reyers et al. 2018). To facilitate the required “rewiring” of how societies work and how we relate to the biophysical world around us will necessitate a different set of strategies than those conventionally used to promote change, which, in most cases, only lead to fine-tuning of our existing ways of doing (Westley et al. 2011, Leach et al. 2012, Olsson et al. 2014). To open up for new trajectories of sustainable development, we will have to unlearn part of what we have learned, dismantle some of the structures that currently prevent change, and encourage more disruptive forms of innovation (Bower and Christensen 1995, Biggs et al. 2010).

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As resilience science has gained recognition, increasing efforts have been made to translate insights from this field into practical management guidelines (Quinlan et al. 2016, Sellberg et al. 2018). *Wayfinder: A Resilience Guide for Navigating toward Sustainable Futures* is the latest addition to this growing field of resilience practice (Enfors-Kautsky et al. 2018). Framed by the Anthropocene argument and taking its starting point in the three key insights outlined above, *Wayfinder* provides a synthesis of the current resilience science frontier, embedded in a clear and coherent process for navigating toward trajectories of sustainable development. It is designed to support development practitioners, project teams, planners, and other changemakers in applying resilience thinking in practice. *Wayfinder* was developed as part of the GRAID (Guidance for Resilience in the Anthropocene: Investments for Development) program at the Stockholm Resilience Center, and as such, the primary audience is the development community. However, we assert that the framework and approach are also suitable for other contexts, including natural resource management and planning, from which resilience practice evolved.

Our purpose here is to provide the scientific rationale and theoretical foundation for *Wayfinder*. Despite the rapid growth of resilience assessment and planning practices since 2000, relatively few frameworks and process guides are documented in the scientific literature. Here, we demonstrate how the *Wayfinder* guide connects with the science behind resilience thinking. We begin by outlining the novel scientific framework that underpins *Wayfinder*, which synthesizes multiple strands of resilience thinking. We then describe how we operationalize this thinking in a five-step process that is designed to facilitate transformative change on the ground. In the discussion, we explain how *Wayfinder* contributes to advancing contemporary resilience practice. Its novelty, we argue, emerges from the combination of four features: (1) *Wayfinder* is framed in a way that enables users to address the complex and intertwined sustainability challenges that characterize the Anthropocene; (2) *Wayfinder* synthesizes many of the recent advances in resilience science into one framework and process to provide a science-based yet practical take on how to address sustainability challenges; (3) *Wayfinder* moves beyond assessment to provide concrete advice for planning and action through a process design that accounts for issues of agency, legitimacy, and power; and (4) *Wayfinder* emphasizes learning as a key mode of operation in the rapidly changing Anthropocene, conceptualizing implementation of action strategies as “collectively learning our way forward.” We begin with an account of the history of resilience practice and end with a call to action directed at both resilience researchers and practitioners to test *Wayfinder* across a range of different contexts so that, jointly, we can advance resilience practice for sustainable development in the decades to come.

A BRIEF HISTORY OF RESILIENCE PRACTICE

The early days: adaptive ecosystem management and the first workbook

The first attempts to translate ideas from resilience science into practical management guidelines trace back to the 1980s, when ideas about natural variability in complex systems started to challenge the existing “command and control” paradigm in natural resources management (Holling and Meffe 1996). This

phase was followed by a range of practical experiments with adaptive management in different settings around the world, the lessons of which were summarized in *Resilience Management in Social-ecological Systems: A Working Hypothesis for a Participatory Approach* by Walker et al. (2002). This early work can be seen as a precursor to the large portfolio of resilience frameworks that exist today, the most well known of which is the *Resilience Assessment Workbook for Practitioners*, which was published by the Resilience Alliance in 2007 and updated in 2010 (Resilience Alliance 2010).

The Resilience Alliance workbook is designed as a practical guide for evaluating a (social-ecological) system’s resilience. Structured around a set of core resilience concepts (e.g., system scales and boundaries, thresholds of potential concern, adaptive cycles of change), the workbook enables users to elicit a better understanding of system dynamics and ultimately to provide management recommendations. Since the publication, thousands of copies of the Resilience Alliance workbook have been downloaded, and numerous case studies and papers cite the methodology. For example, it has been used in regional planning processes with catchment management authorities in Australia (Mitchell et al. 2014, Sellberg et al. 2018), for understanding vulnerabilities and opportunities for development in the whole Arctic region (Carson and Peterson 2016), and to explore options for community development across South-East Asia through the work of the International Union for Conservation of Nature and Mangroves for the Future (Raquibul Amin, *personal communication*). Complete with worksheets and discussion questions, a core strength of the Resilience Alliance workbook is its ambition to make complex concepts practical for a wider audience than the traditional scientific one. However, it offers a mostly technical approach that lacks detailed guidance on the process itself, including important considerations such as stakeholder engagement, legitimacy, and translating the assessment findings into actionable strategies.

Recent developments: a proliferation of different resilience guides

Since the publication of the updated Resilience Alliance workbook in 2010 and the popular science book *Resilience Practice: Building Capacity to Absorb Disturbance and Maintain Function* by Walker and Salt (2012), as well as the international conference “Resilience and development: mobilizing for transformation” held in Montpellier in 2014 (Bousquet et al. 2016), there has been a proliferation of different resilience frameworks and assessment guides that highlight a variety of resilience-related concepts, take different approaches, and serve different purposes.

For example, in 2014, the Satoyama Initiative published *Toolkit for the Indicators of Resilience in Social-Ecological Production Landscapes and Seascapes* (SEPLS indicators), with the aim of helping local populations implement adaptive management of natural resources (UNU-IAS et al. 2014). The same year, Pollard et al. (2014) published their resilience-based framework striving to integrate issues of water and livelihood security in decision-making, and the United Nations Development Programme (2014) put forward their “community-based resilience analysis” (CoBRA) approach. In 2016, the Global Environment Facility commissioned CSIRO in Australia to develop the “resilience, adaptation pathways, and transformation assessment” framework

(RAPTA) to enable the design of development projects that help to build resilience to shocks and stresses (O'Connell et al. 2016). Shortly after, in 2017, Mercy Corps published their "strategic resilience assessment" (STRESS) approach to enable the development of resilience-based theories of change, thus advocating for a more long-term view on development interventions (Levine et al. 2017), and the UK Department for International Development's Building Resilience and Adaptation to Climate Extremes and Disasters (BRACED) program presented their resilience-based development approach and its merits in a synthesis report (Bachofen et al. 2017).

The aforementioned resilience guides reflect just a few among the plethora of approaches to resilience practice that are now available. Several reviews highlight some of the similarities and differences among the existing approaches (Quinlan et al. 2016, Schipper and Langston 2015, Sharifi 2016, Douxchamps et al. 2017) and show that the field of resilience practice has evolved increasingly to focus on development issues in Southern contexts. In tandem, the focus has moved away from expert-led approaches to locally driven participatory approaches, and, rather than simply aiming to generate a better system understanding and provide management recommendations (as the early forms of resilience assessments did), more emphasis is now placed on empowerment and direct action. Additionally, and similar to broader resilience research trends in which resilience theory continues to be interpreted in different ways (Allen et al. 2019), all resilience guides are not equally grounded in resilience science, despite using much of the same terminology. Very few resilience guides operationalize social-ecological systems and complexity, and the coping and adaptation aspects of resilience have been more prominent than transformation. However, potential exists for learning across the different approaches to resilience practice.

While the resilience assessment tradition developed, other innovative approaches for driving change toward sustainability emerged in parallel, providing additional insights into this vastly complex challenge. For example, companion modeling (COMMOD) is a closely related approach offering an alternative perspective on how to solve sustainable development challenges compared to many existing resilience guides (see Etienne et al. 2014). Using participatory modeling to address local resource conflicts, COMMOD emphasizes the importance of the quality of the process for reaching sustainable outcomes, as well as the iterative nature of complex problem solving. Another related field of practice from which resilience practice can draw lessons is the "transition towns" movement (see Hopkins 2008). With a focus on tackling climate change, this field of practice is forward-looking in its ambition to go beyond the local scale, evaluating not only how global and regional drivers affect local realities, but also how local developments aggregate up and affect wider regions and, ultimately, the planet (Sellberg et al. 2017). A third field of practice that has emerged in recent years is the "change lab," such as T-labs and social innovation labs (see Westley and Laban 2015). Stemming from theories on organizational change and social learning, change labs involve structured workshop processes that focus on the power of human agency and innovation in leveraging transformative change toward sustainability. Although these are highly relevant themes for

addressing contemporary sustainability challenges, existing resilience guides have only engaged with them to a limited degree.

Why time is ripe for an integrative framework and process

Beginning in 2016, we looked at a wide variety of resilience-based guides and other contemporary approaches to transitioning toward sustainability, realizing that other sectors and frameworks have insights and practical guidance that would benefit the development of Wayfinder. We drew on the strengths of existing approaches and integrated these into a science-based, practical approach to sustainable development. The approach is firmly based in complexity thinking and brings a social-ecological perspective to current challenges and opportunities without losing sight of the people who are part of the system or the need for a carefully designed and expertly navigated process to be able to drive transformative change.

Recent developments in the resilience science arena also suggested that time was ripe for the development of such an integrated approach. Important scientific advancements have been made regarding the characteristics of the Anthropocene (e.g., Liu et al. 2015, Steffen et al. 2015, 2018, Lenton 2016) and how processes of transformation unfold (e.g., Olsson et al. 2004, Geels and Shot 2007, Gelchich et al. 2010, Moore et al. 2014, Waddell et al. 2015). These developments meant that the science needed to inform such a framework and process was increasingly available. Additionally, the adoption of the 2030 Agenda (United Nations 2015) paved the way for more integrated approaches to sustainable development practice and highlighted the specific need for transformational change.

To seize this window of opportunity, we started to develop Wayfinder in October 2016. Synthesizing the work of a large number of resilience scholars and practitioners, the Wayfinder framework and process design were developed during a two-year period by the authors of this paper in collaboration with a reference group of development practitioners from different organizations. The result, "Wayfinder: A Resilience Guide for Navigating Towards Sustainable Futures," was published online in September 2018 (<https://wayfinder.earth/>).

WAYFINDER: INTRODUCING A NEW GENERATION OF RESILIENCE PRACTICE

We next highlight the theoretical perspectives underpinning the framework to describe how Wayfinder approaches contemporary sustainability challenges. We then outline how this framework is operationalized in a five-phase process for system assessment, planning, and action, outlining the scientific rationale behind the process design.

A novel framework for approaching contemporary sustainability challenges

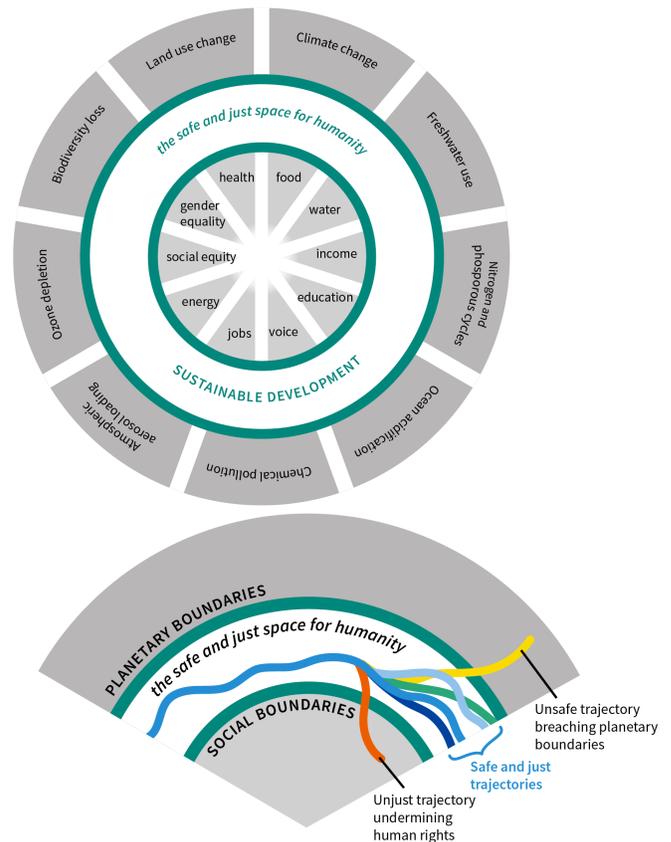
The Wayfinder framework is based on the following assumptions and core perspectives. Sustainable development can only take place along development trajectories that respect both planetary boundaries and social boundaries. Navigating a social-ecological system toward such trajectories will require adaptive and/or transformative change, as well as maintaining option space in the system. To develop efficient strategies for change, simultaneous focus is needed on leverage points for systemic change, agency, and the opportunity context. We next provide a summary of these assumptions and perspectives.

Navigating toward sustainable, safe, and just development trajectories

Wayfinder helps its users to navigate a social-ecological system such as a community, catchment, or food system toward a more sustainable future in contexts characterized by deep uncertainty about the future. Social-ecological systems can develop in a variety of ways depending on both internal system dynamics (i.e., how variables in the system influence each other) and external drivers of change (Walker et al. 2012). In Wayfinder, these multiple possible futures are conceptualized as a set of alternative development trajectories that are (more or less) distinct from each other. For example, an agricultural system could either develop toward high-input cereal monocultures or toward lower input systems with a more diversified set of both crops and animal production. These different trajectories are characterized by different system feedbacks, which determine how the system works on an aggregate level, shaping its development over time (Sendzimir et al. 2007, Cinner 2011, Enfors 2013). Because of these feedbacks, including resulting lock-in effects, changing trajectory is often not a smooth process, but typically requires significant change in key aspects of the system (Scheffer et al. 2001). For some systems, there are key variables with known thresholds that trigger the shift from one well-defined trajectory to another. However, for many systems, the thresholds are not known (Walker and Salt 2012). Although the underlying system thresholds and feedbacks are often difficult to detect, a more accessible feature of systems is the ecosystem services or benefits that are generated along a particular development trajectory (Enfors 2013). System benefits refer to what people value about the system and can be conceptualized in different ways. In Wayfinder, we look at them as a bundle of ecosystem services (Raudsepp-Hearne et al. 2010, Hamann et al. 2015), where individual services and benefits vary in their relative amounts; as a whole, the bundle contributes to human well-being in different ways to different groups of people (Daw et al. 2011).

From a sustainability perspective, some trajectories are clearly more desirable than others in the sense of being more ecologically sustainable and socially just. Human activities have reached a scale where they now affect vital planetary processes. Earth system scientists have identified nine planetary boundaries based on global biophysical processes that regulate the stability of the Earth system, beyond which large-scale and potentially irreversible environmental change is expected (Rockström et al. 2009, Steffen et al. 2015). Staying within the planetary boundaries is thus a prerequisite for continued human development and thriving societies. Similarly, human development needs to ensure that each person on the planet has the ability to meet their basic human rights, i.e., there are social boundaries, based on justice requirements, that need to be considered (Raworth 2012). Combining the planetary and social boundaries creates a doughnut-shaped space within which humanity can thrive and trajectories that are sustainable, safe, and just are possible (Leach et al. 2013, Raworth 2017; Fig. 1). The trajectories that breach biophysical and social boundaries clearly must be avoided. Other trajectories are more contested and may involve difficult choices and dilemmas, often relating to how benefits are distributed among people, including over time (Daw et al. 2015).

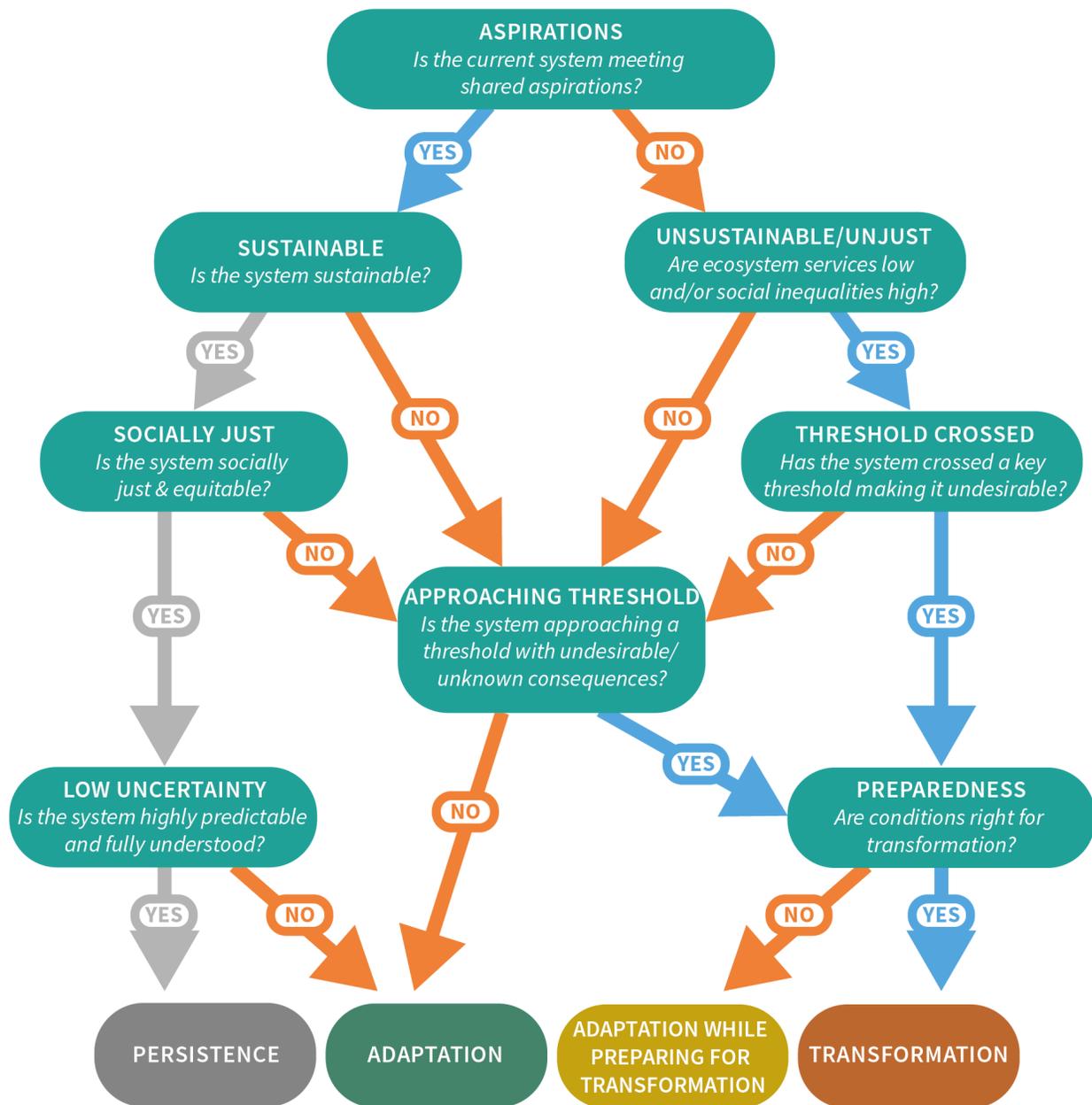
Fig. 1. Trajectories of sustainable development. Combining planetary and social boundaries creates a doughnut-shaped space within which humanity can thrive. Sustainable development can only take place within this so-called doughnut. Within this space, multiple trajectories of development are possible that contribute to the productive capacity of the biosphere to varying degrees and that more or less align with the needs, values, and aspirations of different groups of people. Illustration: E. Wikander/Azote, adapted from Raworth (2012).



Wayfinder aims to help users identify different potential development trajectories for their systems while exploring the benefits and dilemmas that these could entail, to change and redirect the system deliberately to move toward a sustainable, safe, and just operating space. Acknowledging that the planetary boundaries apply at the global level and the social boundaries apply at an individual level, and that it is not necessarily straightforward to translate these concepts to intermediate levels (Dearing et al. 2014), Wayfinder uses Raworth's (2017) doughnut metaphor to emphasize the need of conceptualizing sustainability as a social-ecological endeavor.

Adapting and transforming while maintaining option space
 Depending on the system context and the issues at hand, different types of system-level change will be needed to reach a

Fig. 2. Decision tree to determine what level of change will be required in a social-ecological system. Wayfinder distinguishes between adaptive and transformative change as two broad types of strategies for navigating different trajectories. Adaptation reflects gradual improvements on the current development trajectory, whereas transformation reflects a more radical form of change in which the system embarks on a new, substantively different development trajectory. Illustration: E. Wikander/Azote.



development trajectory that is sustainable, safe, and just. Wayfinder distinguishes between adaptation and transformation as two broad types of strategies for navigating along alternative trajectories (Fig. 2). Wayfinder puts minimal emphasis on maintaining the system as it is (i.e., persistence), largely because development projects typically aim to lead to deeper change to improve human well-being. The notion of persistence over long

stretches of time becomes increasingly irrelevant in the context of the Anthropocene. However, Wayfinder acknowledges that at different points in time, different parts of the system may need to persist, adapt, or transform, and that all three capacities are needed to enable a social-ecological system to continue to develop and thrive (Folke et al. 2010).

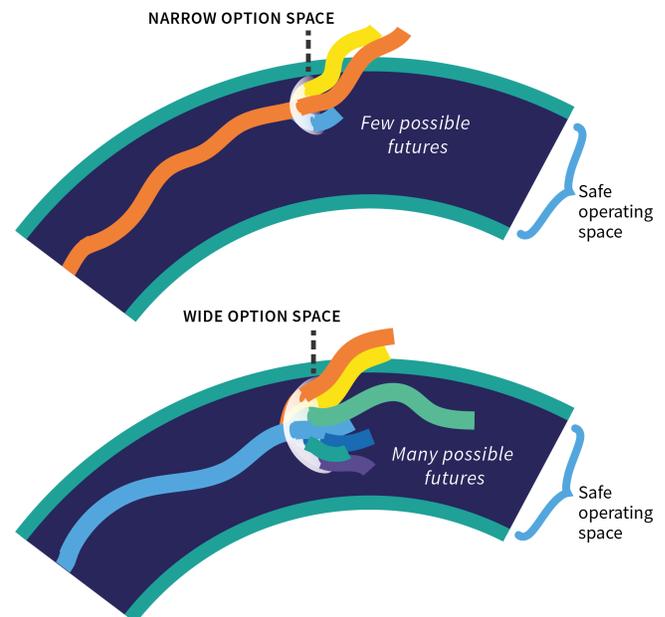
Adaptation refers to sustaining, innovating, and improving the system's performance on the current development trajectory (Folke et al. 2010) in response to changing conditions. This definition reflects a strengthening of the existing key feedbacks in the system so that it continues to move largely in the same direction. However, the environmental challenges that we face today are often so severe, and the trajectories of development so persistently unsustainable and unjust, that adaptive change alone is insufficient to reach a safe and just future. Instead, transformative change of human societies and the way we relate to the ecosystems around us will be necessary (Westley et al. 2011, Leach et al. 2012, O'Brien 2012). Transformation thus refers to a more fundamental type of change, when a social-ecological system embarks on an entirely new and substantively different trajectory of development (Folke et al. 2010). This change requires that new system feedbacks are formed. In some social-ecological systems today, the current development trajectory shows such a degree of lock-in that it can be characterized as a "trap", which reflects a self-reinforcing situation that is both unsustainable and difficult to escape (Cinner 2011, Enfors 2013, Haider et al. 2018). In such cases, change is difficult to achieve, and establishing new feedbacks may not be possible without first destabilizing the existing ones. Thus, transformative change will require a deliberate break with the old to open up for something new.

Navigating social-ecological systems toward sustainable safe and just development trajectories will often require a combination of adaptive and transformative change. For example, transformative change may be required in some sectors (or subsystems) to allow the overall system to continue to adapt. Alternatively, adaptive responses might be needed in the short term while preparing the system for a deeper and more long-term transformation. However, it is important to note that these forms of change are not always compatible, and it is not uncommon that adaptive change reduces the transformative potential in the system by further locking the system to its current trajectory (Holling et al. 2002, Marshall et al. 2012, Olsson et al. 2014). It should also be noted that, to determine what level of change is needed in a system, we must consider both the system dynamics and its state because there is often a lag between the two. For example, a fundamental shift in policy on resource management might not be reflected in the actual resource base for quite some time. So, although the state of the system might still be undesirable, the feedbacks may have started to change.

In summary, Wayfinder conceptualizes the navigation between different system trajectories as a process that happens by enabling adaptive and transformative system change. However, successful navigation toward a more sustainable future in a context of uncertainty also requires that social-ecological systems are managed in ways that keep options open for the future and create new options when old ones close. We refer to this aspect as maintaining or increasing the option space, or the range of future possible choices that are still available in a system (Fig. 3). This aspect is critical in complex and dynamic systems. As conditions change, new problems arise, and the understanding of what sustainable development entails evolves. Thus, maintaining option space is a way to avoid locking systems into trajectories that restrict and reduce future choices. Wayfinder aims to help users solve immediate social and environmental problems through

adaptive or transformative measures while maintaining or increasing the option space to enhance navigational capacity over time. We operationalize the option space concept through seven resilience dimensions, drawing on the work of Biggs et al. (2015) and Salomon et al. (2019), and with inspiration from the general resilience literature (Walker and Salt 2006, Carpenter et al. 2012). We argue that each of the proposed resilience dimensions (Table 1) will enhance the capacity for continuous adaptation and transformation over time.

Fig. 3. Comparison of narrow and wide option spaces. While navigating a system toward sustainability through adaptive and transformative change, it is important to maintain option space, i.e., the range of future choices that remain available in a system. Maintaining options will be key to navigating the rapidly changing Anthropocene, where trajectories of development that seem promising today may become undesirable over time, moving the system beyond planetary and social boundaries. Illustration: E. Wikander/Azote.



Identifying strategies for change by focusing on leverage points, agency, and opportunity

To identify strategies for adaptive and transformative change while maintaining option space, Wayfinder simultaneously focuses on leverage points to change system dynamics, agency to influence those leverage points, and the existing opportunity context to realize the desired change. Leverage points are places in the system dynamics where a small change can have a disproportionately large effect on the overall system behavior (Meadows 1999, Abson et al. 2017) and thus influence the trajectory of development. Wayfinder emphasizes the importance of addressing deep, systemic leverage points such as values and worldviews (O'Brien and Sygna 2013). However, identifying leverage points will in itself not drive change, but needs to be coupled with the agency required to influence movement in the

Table 1. Seven option space dimensions and the features that contribute to the long-term capacity to navigate change.

Dimension	Motivation	Reference
Foster biosphere stewardship and a culture of reciprocity	In many contexts, navigating toward sustainable, safe, and just futures will require reconnecting to the surrounding ecosystems, becoming active stewards of planet Earth, and fostering a sense of connection and reciprocity between people near and far	Chapin et al. 2010 Folke et al. 2011 West et al. 2018
Build capacity for complex systems thinking Encourage innovation, learning, and reflexive practice	Social-ecological systems are highly complex; consistently striving to look below the surface for explanations is central for navigating toward sustainability This dimension is the most viable approach to managing and working within complex systems in the Anthropocene, where uncertainty, emergence, and surprise are characteristic features	Biggs et al. 2015 Salomon et al. 2019 Chapin et al. 2010 Biggs et al. 2015 Moore et al. 2018 Salomon et al. 2019
Maintain social and ecological diversity and redundancy	System components with a diversity of responses, overlaps, and back-up functions will provide key sources to draw from in the face of change	Chapin et al. 2010 Walker and Salt 2012 Biggs et al. 2015 Salomon et al. 2019
Manage cross-scale interactions and connectivity in the social-ecological system	This dimension is critical in a hyperconnected world, where global and regional trends affect all local prospects for development, and local actions aggregate up to produce systemic effects; it will help reduce the vulnerability to shocks that propagate through the system and will enable diffusion of innovative practices	Biggs et al. 2015 Walker and Salt 2012 (although focused on modularity and openness) Salomon et al. 2019
Manage system feedbacks	Monitoring slowly changing system variables and identifying key system feedbacks is essential for creating both adaptive and transformative change; the process includes identifying traps, where adaptive change in the short term may reduce the prospects for transformative change in the long term	Walker and Salt 2012 Biggs et al. 2015 Salomon et al. 2019
Promote inclusive and adaptive governance, integrating issues across sectors and scales	Inclusive governance arrangements in which people actively participate in management decisions through adaptive processes that respond to change and enable emergence and that integrate relevant issues across sectors and scales will greatly improve adaptive and transformative capacity over time	Chapin et al. 2010 Walker and Salt 2012 (focusing on leadership, networks, and trust) Biggs et al. 2015 Chaffin et al. 2016 Salomon et al. 2019

desired direction (Westley et al. 2013). A change process such as Wayfinder therefore needs to draw upon and build skills, resources, and motivation among key individuals and groups that are strategically positioned within the system (Westley et al. 2013). Thus, a key question that Wayfinder considers is: “Who has the agency to make this type of change happen?” Furthermore, research has shown that systemic change is not equally likely to happen at all points in time, but requires that conditions for change are favorable (Olsson et al. 2004, Gelcich et al. 2010). Some scholars have referred to existing social and institutional structures as an ever-changing “opportunity context” (Dorado 2005, Westley et al. 2013) that may enable or hinder changemakers to influence different levers in the system and that needs to be navigated or altered strategically. In certain contexts, at certain points in time, conditions for systemic change, and particularly transformative change, may simply not be right. For instance, key institutions, policies, or mindsets may not be open for change or reinterpretation, and key individuals with power in the system may block change. In such cases, strategies for change may primarily be directed toward preparing the system for change, which may include nurturing marginalized but promising initiatives, working to shift power structures, mobilizing resources, building social networks, and creating new narratives (Westley et al. 2013, Bennett et al. 2016, Pereira et al. 2018).

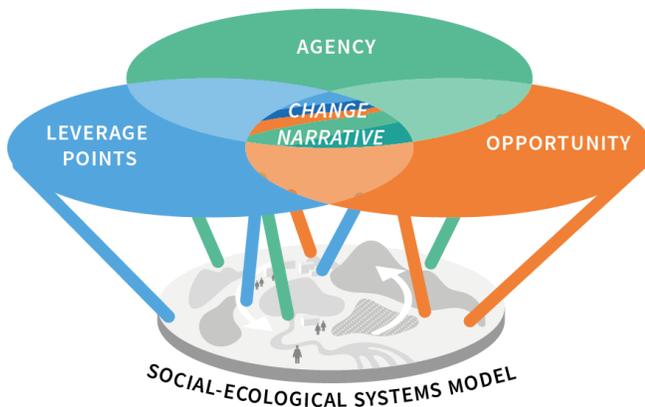
Wayfinder stresses the need to address simultaneously leverage points, agency, and opportunity. This construct is used as a triple-focus lens through which Wayfinder users look at the social-ecological system in question to develop a “change narrative” (Fig. 4), which is a shared storyline about how change may unfold

in the system. As users’ understanding of their system is refined over the course of the Wayfinder process, so too does the change narrative gradually become increasingly plausible and concrete. It serves the purpose of articulating assumptions about how feedbacks in the system could be influenced, by whom, and when, to bring about the desired adaptive or transformative change, and it supports users in their learning. The change narrative is one of the main outputs of a Wayfinder process. It can be seen as a continually developing hypothesis about how to navigate toward more sustainable, safe, and just futures.

The change narrative offers a complexity perspective on the idea of “theory of change”, which is frequently used in the development community for similar purposes (and in several resilience assessment frameworks, including RAPTA and STRESS). The purpose of outlining a theory of change is usually to make explicit how one’s actions are expected to lead to the desired outcome, for example, by linking strategies to impact via outputs and outcomes. Although a theory of change can be useful to identify underlying assumptions about how change happens in a particular context, the concept is often applied in a rather static way that makes it ill suited for dealing with complex social-ecological challenges (Preiser et al. 2017, Mahajan et al. 2019). Firstly, conventional theories of change tend to assume a linear cause-and-effect model of change, whereby inputs lead to outputs and outcomes in a predictable manner. This approach does not take into account key features of complex systems, such as feedbacks, unintended consequences, cascading effects, and lock-ins. Secondly, a theory of change often implies a single way forward in contrast to the multiple possible future trajectories

that often exist in reality. In Wayfinder, therefore, we have chosen the more dynamic concept of a change narrative to make explicit the links between leverage, agency, and opportunity, while emphasizing that uncertainty is a key characteristic of the Anthropocene that we must remember.

Fig. 4. Innovative strategies for change are designed using a triple-focus lens. Wayfinder's approach to designing change strategies draws on users' understanding of systems dynamics and looks at these dynamics to identify leverage points for systemic change, actors with capacity to influence those points, and the overall opportunity context for realizing change in the system. Illustration: E. Wikander/Azote.



A participatory process designed for driving systemic change

The Wayfinder framework is operationalized through a five-phase process, the design of which is based on two foundational insights. The first insight is that navigating toward sustainability is both a question of “What must be done?” to shift the system toward safe and just trajectories and “How must it be done?” to enable lasting change. To reflect this idea, the Wayfinder process is designed to help users maintain dual focus on the quality of the process and on the quality of the content generated in the process. The second insight is that to navigate the ever-changing Anthropocene successfully, we must embrace complexity, deal with uncertainty, and accept the fact that the change that we try to facilitate has no endpoint, i.e., both adaptation and transformation are continuous processes. The Wayfinder process is therefore designed to encourage in-depth learning (Marton and Säljö 1976a,b) and reflexive practice as the *modus operandi*. We next develop these two insights.

Maintaining dual focus on process and content

Wayfinder is firmly based on the understanding that driving change toward sustainability requires deep engagement and long-term commitment of concerned stakeholders (Walker et al. 2002, Armitage et al. 2009, Berkes 2017, Miller and Wyborn 2020). The process through which knowledge is generated and decisions are made is critical to build collective understanding, agency, and commitment for change (Tengö et al. 2014, van der Hel 2016). Furthermore, a fair and transparent process increases the prospects that the action strategies developed will actually lead to the desired change and that outcomes are perceived as

legitimate and relevant (see, e.g., Chambers et al. 1989). Thus, how a process such as this is conducted, who is involved, and in what way and when, are of utmost importance for the outcome. In Wayfinder, these issues are of central concern.

However, having all key actors involved at the right time and running a good process will not in itself ensure a more sustainable future. The challenges that we face today are highly complex and typically require substantial learning and scientific input to gain a systemic understanding of the problems at hand. Decisions that are based on a limited understanding of the Anthropocene context are unlikely to contribute toward a more sustainable, safe, and just future, no matter how inclusive and transparent the knowledge-generation and decision-making processes have been. Therefore, Wayfinder puts equal emphasis on generating or eliciting rich knowledge, be it high-quality scientific data or other relevant knowledge such as local ecological knowledge, about the sustainability challenges at hand, and on conducting a legitimate process that builds capacity and connections between stakeholders to find a way forward collectively (Fig. 5). Importantly, the knowledge input to the process is based in systems thinking and draws on knowledge of, for example, system dynamics, feedback effects, and thresholds.

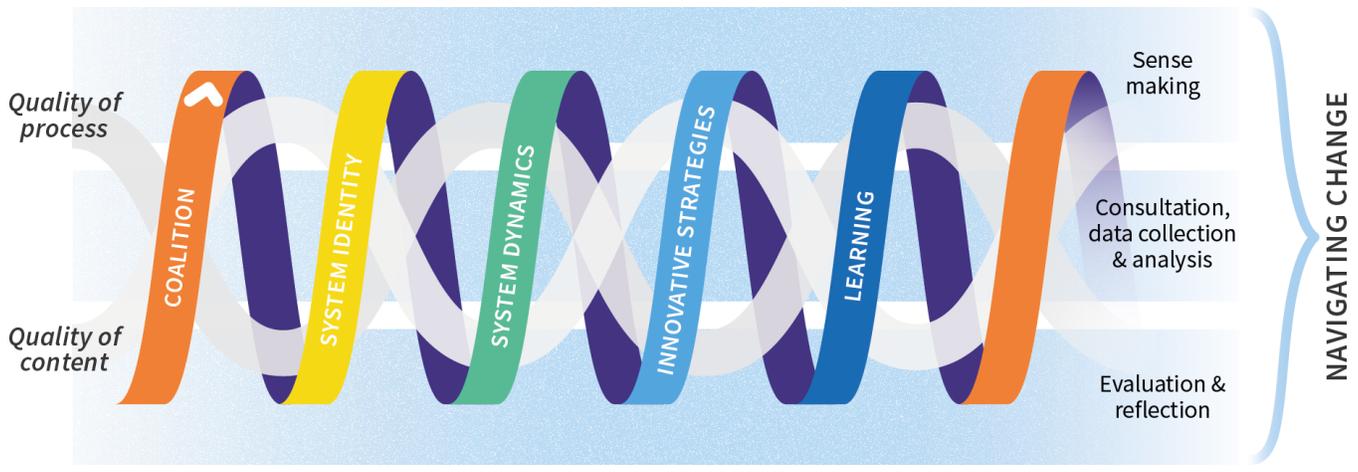
In-depth learning and reflexive practice as modus operandi

The Wayfinder process design is also firmly based on the understanding that sustainable development practice in the Anthropocene must embrace learning as a fundamental management mechanism (Berkes 2017). Although this perspective may sound self-evident, it represents a rather large shift in thinking in a society in which the “efficiency paradigm” prevails (Colby 1991, Walker and Salt 2006), we expect that problems should have neat solutions, and deeper reflection often is perceived to take too much time. The Anthropocene predicament challenges the established thinking around efficiency and simple solutions.

Social-ecological systems today are incredibly complex and nested across system levels. Their behavior is governed by interactions among a large number of variables in response to an ever-changing set of external drivers. Typically, they exhibit nonlinear patterns of change and emergent properties (Levin et al. 2013, Presier et al. 2018), with two important implications. First, our understanding of the social-ecological systems that we are part of and try to navigate will never be more than partial. Second, it is difficult to predict the full outcome of the management interventions that we design. If we only monitor a system for expected outcomes (which often is the case in the monitoring, evaluation, and learning approaches that dominate current development practice; e.g., Lemon and Pinet 2018) and fail to question assumptions about how things work, there is a high likelihood that we will fail to register unintended consequences of our actions, which could counteract our ambition to navigate toward a more sustainable future.

To meet this reality, the Wayfinder process encourages reflexive practice and in-depth learning as a key mode of operations. As stated in its introduction, “each phase ends with a set of evaluation, reflection and sense-making questions that help you decide if you are ready to move on to the next phase.” The implementation of action strategies in Wayfinder is a learning process that is designed to stimulate not only single-loop learning,

Fig. 5. The Wayfinder framework is operationalized through a process in five phases. The process is set up to balance the need for running a legitimate, fair, and transparent process with generating high-quality data, scientifically sound analyses, and producing solid content. The process emphasizes the importance of in-depth learning and reflexive practice for navigating toward more sustainable futures in the Anthropocene, and users are encouraged to iterate between three different modes of thinking. Illustration: E. Wikander/Azote.



but also double- and triple-loop learning (as in Argyris and Schön 1974, Pahl-Wostl 2009, Moore et al. 2018), allowing users continually to test the strategies that they have identified, to probe underlying assumptions, and to challenge system structures as well as their own motivations and rationale. To allow for deeper insights to emerge, Wayfinder practitioners are encouraged to iterate continuously among three modes of action and thinking: (1) consultation, data collection, and analysis; (2) evaluation and reflection; and (3) deeper sense-making (Fig. 5).

An iterative process in five phases

Wayfinder is structured in five iterative but progressing phases (Fig. 6). The content of each phase is divided into a number of modules and work cards, which come with a set of associated activity sheets and discussion guides that are intended to help users along the way. Compared to previous resilience assessment approaches, Wayfinder gives strong emphasis to phase 1 as laying the necessary foundation for the remainder of the process. Drawing on concepts such as strategic agency (Westley et al. 2013) and acknowledging the key role that both different types of change-makers (Olsson 2017) and bridging organizations (Schultz et al. 2015) often can play, this phase is based on the understanding that, to drive systemic change (particularly transformative change), it is of key importance to bring together a committed, capable, and legitimate coalition of people, with connections across sectors and scales, that can steward the process and implement the change strategies that emerge. An important activity in phase 1 is to enhance the capacity for systems thinking and reflexive practice among coalition members. In addition, phase 1 also addresses process-related concerns such as tailoring the process to the local context, agreeing on ethical guidelines, and deciding on principles for stakeholder participation.

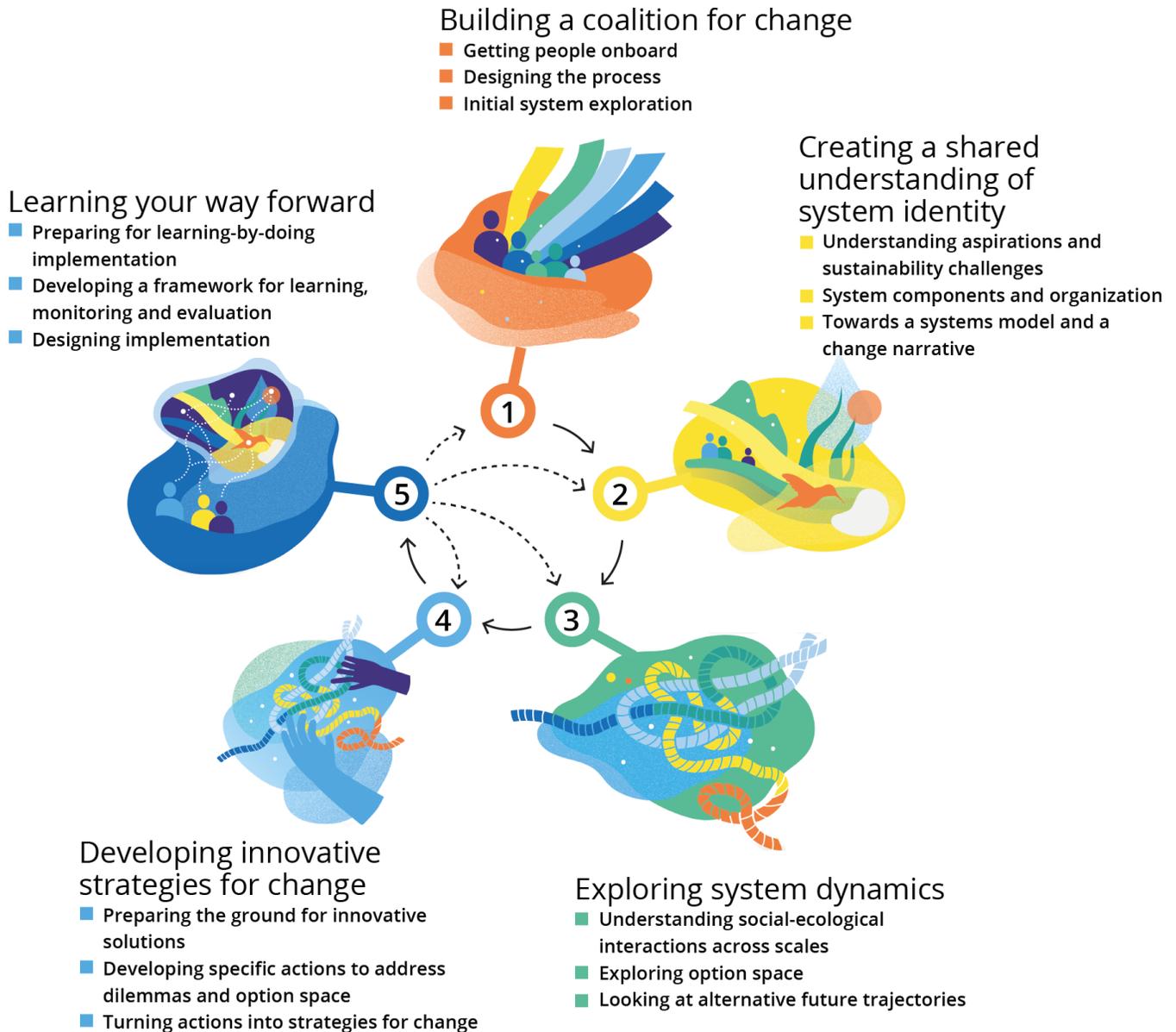
In phase 2, the coalition anchors the change process within a wider group of stakeholders to draw on multiple sources of knowledge (Tengö et al. 2014, 2017), increase engagement, and make sure

that the focus of the process is relevant, legitimate, and addresses the real concerns of the people in the system. Phase 2 explores what aspects of the system people value, and how any benefits generated are currently distributed (e.g., Daw et al. 2011). It also focuses on the most important sustainability challenges at hand, which are referred to as social-ecological dilemmas. This step gives the process a provisional direction because the definition of what actually constitutes the social-ecological system stems from this problem formulation.

The more technical system assessment takes place in phase 3. This phase comprises two processes. First, it involves an in-depth analysis of the current system dynamics (Meadows 1999, Abson et al. 2017), including the identification of important cross-scale interactions as well as potential thresholds and traps that generate the current benefits and dilemmas. Second, it involves an assessment of how the system's option space is developing (drawing on the methodology developed by Salomon et al. 2019) and a scenario exploration of a set of plausible future development trajectories in the system (as exemplified by Enfors et al. 2008, Oteros-Rozas et al. 2015, Pereira et al. 2018).

In phases 4 and 5, the process moves from system assessment into strategic planning and action. Again, compared to previous resilience assessment approaches, Wayfinder puts strong emphasis and provides practical guidance on how to turn the deep systemic understanding gained through the assessment into action. Thus, phases 4 and 5 focus on developing and implementing a strategic action plan. In phase 4, users design innovative action strategies for adaptive and/or transformative change that simultaneously enhance option space. This process is done through a triple focus on leverage points for systemic change, the agency to influence those points, and the overall opportunity context (drawing on Meadows 1999, Olsson et al. 2004, 2017, Dorado 2005, Westley et al. 2013, Abson et al. 2017). The change narrative, which becomes increasingly substantiated over the

Fig. 6. Wayfinder is an iterative process in five phases that helps users better understand their system, develop innovative strategies for change, and collectively learn their way forward. It starts with the creation of a coalition for change that will lead the process forward, moving on to focus on system identity, explore system dynamics, develop strategies for change, and finally test these strategies in reality and learn the way forward. The lessons learned through implementation will allow users to refine the systems understanding and strategies for change gradually, starting a new iteration of the Wayfinder process. Illustration: E. Wikander/Azote.



course of the Wayfinder process, takes the form of a concrete action plan at the end of phase 4. Phase 5 involves implementing the action plan through a learning-by-doing approach. This phase emphasizes the importance of building a learning culture, pilot-testing the action strategies, and preparing for the scaling out and institutionalization of successful strategies. Implementation is treated as an opportunity to test and refine the insights gained through the first iteration of the process and further develop the change narrative, which may start a new iteration of the process.

As shown in this brief overview of the content, the Wayfinder process incorporates ideas and concepts from several different strands of resilience thinking, as well as from related scientific fields. Although we cannot account for all concepts and ideas here, we have summarized how Wayfinder integrates and operationalizes some of the main insights made in resilience science since the publication of the updated resilience assessment workbook (Resilience Alliance 2010), as well as how it builds on foundational ideas within systems' thinking and resilience (Table 2).

Table 2. Recent insights in resilience science and how Wayfinder builds on and operationalizes them, with key references.

Scientific insight	Operationalization in Wayfinder	Reference
Coproduction of knowledge for navigating toward sustainability: the process through which knowledge is generated and decisions are made is essential to create commitment for change	Process design emphasizes the “how” as much as the “what” Legitimacy is key when composing the coalition for change Principles for stakeholder participation and ethical guidelines are agreed on early on in the process Aspirations, benefits, and dilemmas are explored with a broad range of stakeholders Drawing on multiple knowledge sources to create a shared system understanding Involving stakeholders in experimentation with change strategies, monitoring, and evaluation Characterizing the current trajectory of the system in terms of benefits, dilemmas, and dominant feedbacks	Tengö et al. 2014 Berkes 2017 Miller and Wyborn 2020
Navigating alternative development trajectories: the future is conceptualized as consisting of multiple possible trajectories, and navigating toward the more sustainable ones will often require transformative (rather than adaptive) change	Mapping the historical development trajectory to reflect on why the system behaves as it does currently Horizon scanning to identify novel trends Developing alternative plausible future scenarios Differentiating between action strategies that favor adaptive and transformative development Strategic actions designed to be robust across multiple possible futures	Folke et al. 2010 Enfors 2013 Moore et al. 2014 Oteros-Rozas et al. 2015 Bai et al. 2016 Steffen et al. 2018
Planetary and social boundaries: sustainable development in the Anthropocene means pursuing future trajectories that are both safe and just, which will require reconnecting to the biosphere as well as reciprocity and care Bundles of ecosystem services create system benefits and social-ecological dilemmas: different development trajectories provide different ecosystem services that affect human well-being at multiple scales System feedbacks, lock-in effects, and system traps: the structuring role of system feedbacks shapes the trajectory and carries the risk of lock in-effects such as traps Maintaining future option space: immediate sustainability challenges need to be addressed in a way that maintains the capacity to navigate change for the long term, operationalized through seven resilience principles Cross-scale interactions: in the hyperconnected Anthropocene, local realities are intimately connected with developments elsewhere, and distant places are connected in novel ways	Articulation of a high-level goal for the system that addresses both planetary and social boundaries Decision-tree tool to help clarify the level of change required to stay within boundaries Consistent focus on biosphere-based development approaches Mapping bundles of ecosystem services to explore system benefits and social-ecological dilemmas Articulating how the distribution of ecosystem services affects different groups Exploring alternate future trajectories from an ecosystem services perspective Exploring how social-ecological dilemmas relate to sustainable development goals Developing causal loop diagrams and other models of system dynamics to explain key dilemmas Identifying thresholds and traps from a systems perspective Designing innovations that specifically target leverage points that may unlock traps Developing locally-relevant option space indicators Analyzing changes in the seven dimensions of option space over time Designing strategies for change that simultaneously maintain or enhance option space Continuous focus on the inherent uncertainty of the Anthropocene, e.g., through a “change narrative” Creating a coalition of changemakers situated at different system levels and including bridging functions Analyzing system dynamics from a multiscale perspective, including simple models of key cross-scale interactions and adaptive cycles nested across scales, and identifying both proximate and distal drivers for change Strategies for action target multiple scales Strategies for action consider effects beyond the focal system, i.e., how local development may influence development potential elsewhere Enhancing systems literacy in coalition members to identify leverage points Integrating leverage points as one of three key components of the change narrative Considering different leverage points, implementation, and relative impacts Strategic action plan to target deep leverage points	Rockström et al. 2009 Raworth 2012 Leach et al. 2013 Steffen et al. 2015 Folke et al. 2016 Bennet et al. 2009 Daw et al. 2011, 2015 Hamann et al. 2015 Sendzimir et al. 2007 Cinner 2011 Enfors 2013 Haider et al. 2018 Chapin et al. 2010 Walker and Salt 2012 Biggs et al. 2015 Salomon et al. 2019 Liu et al. 2013 Westley et al. 2013 Schultz et al. 2015 Österblom et al. 2017
Systemic leverage points: creating and directing change through systemic leverage points (often linked to feedbacks), especially deep leverage points relating to values and paradigms Innovation: particularly the type that contributes to redirecting social-ecological interactions, plays a key role in facilitating adaptive and transformative change	Enabling innovation through strategic participation and combining knowledge Tips for enabling innovative thinking, including reframing key issues and challenging existing assumptions Design criteria for innovative actions Interpreting innovation in relation to leverage points and potential to influence system dynamics	Meadows 1999 O'Brien and Sygna 2013 Abson et al. 2017 Westley et al. 2011 Leach et al. 2012 Olsson et al. 2014, 2017
Agency: understanding how change agents facilitate systemic change, operating strategically within the opportunity context	Bringing together a committed and legitimate group of people to form a coalition with the right sets of skills and influence Reflecting on different kinds of capacities needed throughout the change process Linking the Wayfinder process to other ongoing change processes Integrating agency and opportunity context as key parts in the change narrative Reflecting on opportunity context for the action plan and if a window could be created	Olsson et al. 2004 Dorado 2005 Gelcich et al. 2010 Westley et al. 2013
In-depth learning and reflexive practice: double- and triple-loop learning and reflexive practice are essential modes of operation in the rapidly changing Anthropocene	Integrating design time into the process for deep reflective practice Providing discussion guides for most work cards and a set of evaluation, reflection, and sense-making questions in each phase Guidance for setting up a system for information management and learning Articulating assumptions of how change happens and developing a dynamic change narrative Taking into account the potential for unintended consequences associated with strategies for change Developing relevant variables for monitoring and evaluation Conceptualizing implementation as “collectively learning our way forward”	Pahl-Wostl 2009 Berkes 2017 Moore et al. 2018

In terms of applicability and usefulness in different contexts, Wayfinder is generic enough to be used worldwide, but the process is designed to focus on a social-ecological system at a given focal scale such as a catchment, community, or food system. Furthermore, a Wayfinder process is deeply collaborative and requires dialogue across different groups of stakeholders and actors with diverse interests and goals. Highly skilled facilitation is required, but Wayfinder is nonetheless not suited for highly conflictual or highly unequal contexts. Given the emphasis on long-term systemic change, it is also highly recommended that a Wayfinder process be led by a group of people with long-term presence in the area.

DISCUSSION

Wayfinder's four contributions

Although Wayfinder shares its roots with, and builds further upon, earlier resilience assessment approaches, it reflects a new generation of resilience practice. We believe that the novelty of Wayfinder emerges from the combination of (1) the pronounced Anthropocene perspective, (2) the integration of several strands of resilience thinking into one coherent framework, (3) the effort to move beyond system assessment to provide concrete advice for planning and action, and (4) the emphasis on collaborative learning as a key for navigating toward sustainability. Together, these factors make for an approach to resilience practice that we believe will be able to inform planning and management in general, and sustainable development practice in particular, in the years to come. We next explain why.

First, the framing of the Wayfinder process is new and differs from previous resilience practice frameworks. Wayfinder specifically sets out to facilitate transformations toward sustainable, safe, and just development trajectories in the Anthropocene. This aspect is important because the framing emphasizes the necessity of conceptualizing the quest for sustainability as an intertwined social-ecological endeavor, with important cross-scale implications, along with the need for transformative change, if we are to make the required progress toward sustainability. The transformative focus, in particular, has received limited attention in conventional development practice, where much focus has been on coping and adaptation (Brown 2015, Reyers et al. 2018), despite the Agenda 2030 explicitly acknowledging transformation as a prerequisite to reach its goals.

Second, Wayfinder synthesizes and operationalizes the frontier in resilience into one clear, coherent, and practical framework and process. Since 2000, important scientific advancements have been made that have provided insights on, for example, the unique characteristics of the Anthropocene (Crutzen 2002, Waters et al. 2016), the role of innovation and agency in facilitating transformative change (Olsson et al. 2004, Folke et al. 2005, Chapin et al. 2010, Westley et al. 2013), and learning in complex systems (Pahl-Wostl 2009, Berkes 2017, Moore et al. 2018). These advancements contribute knowledge that we need to address the profound sustainability challenges that we face today. However, as in any evolving research field where advances are made simultaneously on multiple frontiers, the scientific field of social-ecological resilience is, at this point, not necessarily conceptually consistent, and adjacent ideas are not yet integrated. With Wayfinder, we have synthesized many of the current ideas (see

Table 2) into one single framework that is conceptually coherent and applicable in practice. While developed to facilitate action, we believe that the synthesis provided in Wayfinder will be useful for the maturing research field of resilience science as well. It will enable the testing of resilience-based hypotheses across a range of realities, which may contribute to new insights, as well as ensure the continued societal relevance of this field of scholarship.

Third, Wayfinder moves beyond system assessment and provides clear guidance on planning and implementation. In previous resilience assessment frameworks, there is a tendency to focus more on the technical and analytical aspects of understanding how a system works, and process design is not a main focus. Although Wayfinder draws on the workbook tradition (Resilience Alliance 2010), one of its key contributions is the deliberate focus on agency, where aspects of participation, knowledge coproduction, legitimacy, and power are given more consideration. Because Wayfinder is not purely an assessment of the current state of affairs but a process for change, the increased attention given to the processes of knowledge generation and decision-making while ensuring that the content is grounded on a sound understanding of the Anthropocene's challenges and opportunities (i.e., the dual focus on process and content) should increase the chances of it being a successful tool for driving change.

Fourth, as a consequence of its complexity focus, Wayfinder fully embraces a learning approach to management. The wicked sustainability problems of today may have contested definitions and be difficult to conceptualize and describe fully, and remedies may be relative rather than absolute (Rittel and Webber 1973); solving them will require new approaches to management. However, globally, the default mode of operations in planning, development practice (Ramalingam 2013), and elsewhere is based on assumptions about high levels of control and low levels of uncertainty. It therefore gives preference to efficiency-based strategies, which often further entrench current problems instead of solving them. In contrast, Wayfinder emphasizes the need for reflexive practice and in-depth learning as the key mode of operation, allowing the continual probing of assumptions about how things work, questioning of underlying motivations, and making deeper sense of where actions are leading and whether they lead to more sustainable futures.

Minimum requirement approaches vs. deep processes to facilitate change

Wayfinder is an ambitious process. It draws together many different types of data and information and involves a range of different stakeholders. There will typically be multiple activities running in parallel with lots of information and feedback being generated. Without a doubt, this process will be challenging and will require a set of advanced process- and content-related skills, including expert facilitation. Furthermore, implementing a complexity-based and resilience-focused approach, in most cases, will mean working against the dominant efficiency-based paradigm. The Wayfinder process requires a different way of working, different metrics of success, and a different mindset than many people are used to, which may be met with some resistance. Finally, running a change process like Wayfinder will require long time frames and appropriate resources. One iteration of the process may take a year to complete, but it could also take longer,

depending on the context. Although the process poses challenges (especially in the project-focused reality of contemporary sustainable development practice) and requires commitment, it is our firm belief that there are no quick fixes to the deeply entrenched sustainability challenges of the Anthropocene. This belief is why, despite frequently repeated requests to develop a “minimum requirement” resilience assessment approach, we opted to develop Wayfinder as a long-term participatory approach. Our working assumption is that it takes time to develop sufficient collective commitment to change, to understand complex system dynamics, and to enable shared learning among stakeholders working across scales. Although conducting a full Wayfinder process may not always be possible because of various constraints, we believe that individual components of the process (e.g., an individual module or a subset of the work cards) can be used to inform more traditional forms of planning and sustainable development practice. Nevertheless, the prospects for leveraging deeper change will decline if those individual components are not part of a well-designed process.

A call to action to test Wayfinder and jointly to develop resilience practice further

During its development, Wayfinder has benefitted from pilot testing in the Ranérou region of Senegal (Arthur Perrotton et al., *unpublished manuscript*) in a research and development project that is part of the Great Green Wall initiative. We are very grateful for the insights emerging from this experiment, which led us to change, among other things, how we formulated the first phase in the process. To continue to test the approach, additional pilot studies across a range of different contexts are currently being planned. Capacity building to facilitate the Wayfinder process, and connecting practitioners through a global community of practice, will be essential to enhance learning further and to refine the approach over time. The Wayfinder process guide is published under a creative commons license to enable uptake and further development by anyone. As many before us have pointed out, it is clear that the role of science in society is changing in the face of the enormous and intertwined sustainability problems that we face today, which requires collaboration between disciplines within academia as well as collaboration between academia and other sectors of society (e.g., Lang et al. 2012). As Miller and Wyborn (2020:94) plainly put it, “Co-production is an inevitable and ubiquitous feature of modern societies. It cannot not happen.” The maturity that the field of resilience science has reached over the past decade, in combination with the demand from the sustainable development sector for resilience-based approaches, provide excellent conditions for bridging science and practice and constitute a window of opportunity for approaches such as Wayfinder. We invite readers of this paper to join us in applying and testing the Wayfinder approach across different contexts and providing feedback, e.g., through case studies, publications, or direct correspondence, so that we can jointly learn our way forward toward more sustainable, safe, and just futures.

CONCLUSIONS

Synthesizing the frontiers in resilience thinking into a conceptually coherent framework and an action-oriented process, Wayfinder reflects a new generation of resilience practice. For practitioners, Wayfinders’ Anthropocene framing and social-ecological systems focus, practical take on cutting edge science,

dual emphasis on process and content, and learning approach to management hold promise for addressing the complex sustainability challenges that emerge in the 21st century. For resilience scholars, Wayfinder provides an opportunity to test and refine theories across a range of different contexts to further the understanding of dynamic change and sustainability in the Anthropocene.

Responses to this article can be read online at:

<https://www.ecologyandsociety.org/issues/responses.php/12176>

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Data Availability:

There are no data associated with this paper.

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