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planet positive 2030

Strong Sustainability by Design

GLOBAL METHODOLOGIES

An initiative supported by the IEEE Standards Association

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Strong Sustainability by Design - Version 1 (Draft)

Request for Input

Public comments are invited on the first version of ***Strong Sustainability by Design: Prioritizing ecosystem and human flourishing with technology-based solutions*** that identifies specific issues and pragmatic recommendations regarding sustainability and climate change to achieve "Planet Positivity" by 2030.

This draft compendium has been created by committees of the Planet Positive 2030 Initiative[1] that is supported by IEEE Standards Association (IEEE SA). The Planet Positive 2030 Initiative community is composed of several hundred participants from six continents, who are thought leaders from academia, industry, civil society, policy and government in the related technical and humanistic disciplines. At least one hundred fifty members of this community have contributed directly and have worked to identify and find consensus on timely issues.

The document's purpose is to identify specific issues and candidate recommendations regarding sustainability and climate change challenges to achieve "Planet Positivity" by 2030, defined as the process of transforming society and infrastructure by 2030 to:

- Reduce GreenHouse Gas (GHG) emissions to 50% of 2005 emissions by 2030[2]
- Significantly increase regeneration and resilience of earth's ecosystems[3]
- Be well on the path to achieving net zero GHG emissions by 2050 and negative GHG emissions beyond 2050
- Continue to widely deploy technology as well as design and implement new technological solutions in support of achieving technological solutions designed and deployed to achieve "Planet Positivity"

In identifying specific issues and pragmatic recommendations, the document:

- Provides a scenario-based challenge (how to achieve "Planet Positivity by 2030") as a tool to inspire readers to provide contextual technical and general feedback as part of this RFI.
- Advances a public discussion about how to build from a "Net Zero" mentality to a "Net or Planet Positive" ("do more good") societal mandate for all technology and policy.
- Continues to build a diverse and inclusive community for the Planet Positive 2030 Initiative, prioritizing the voices of indigenous and marginalized members whose insights are acutely needed to help ensure technology and other solutions are valuable for all. Of keen interest is how we can encourage more in-depth participatory design in our processes.
- Inspires the creation of technical solutions that can be developed into technical standards (IEEE Standards Association, for example ICT and power & energy related standards, IEEE P7800™ series) and associated certification programs.
- Facilitates the emergence of policies and regulations; regulations that would potentially be interoperative between different jurisdictions (countries).

[1] Planet Positive 2030is part of The Sustainable Infrastructures and Community Development Industry Connections program

[2] As described in the United Nations Climate Change Conference (COP 21) Paris Agreement of 2015.

[3] According to the High Ambition Coalition for Nature and People, "In order to address both the biodiversity crisis and the climate crisis, there is growing scientific research that half of the planet must be kept in a natural state….experts agree that a scientifically credible and necessary interim goal is to achieve a minimum of 30% protection by 2030." Protection for land and water of "30 x 30 by 2030" was recommended during COP15 United Nations Convention on Biological Diversity.

By inviting comments for *Strong Sustainability by Design*, the Planet Positive 2030 community provides the opportunity to bring together multiple voices from the related scientific and engineering communities with the general public to identify and find broad consensus on technology to address pressing environmental and social issues and proposed recommendations regarding development, implementations and deployment of these technologies.

Details on how to submit public comments are available in the **Submission Guidelines**.

Comments in response to this request for input will be considered by the Planet Positive 2030 Initiative committees for potential inclusion in the first public edition of *Strong Sustainability by Design* ("*Strong Sustainability by Design*, First Edition") anticipated to be made available to the general public during the fourth quarter of 2023.

- For further information, learn more at the Planet Positive 2030 Initiative website.
- For our Frequently Asked Questions (beyond RFI submission), please click here.
- Get in touch at: PlanetPositive2030@ieee.orgto get connected to a committee or any other reason.
- Please, subscribe to our newsletter here.

If you're a journalist and would like to know more about the Planet Positive 2030 Initiative, please contact: Standards-pr@ieee.org

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Strong Sustainability by Design is not a code of conduct or a professional code of ethics. Engineers and technologists have well-established codes, and we wish to respectfully recognize the formative precedents surrounding issues of sustainability and the professional values these codes represent. These codes provide the broad framework for the more focused domain addressed in this document, and it is our hope that the inclusive, consensus-building process around its design will contribute unique value to technologists and society as a whole.

This document is also not a position, or policy statement, or formal report of IEEE or any other organization with which is affiliated. It is intended to be a working reference tool created in an inclusive process by those in the relevant scientific and engineering communities prioritizing sustainability considerations in their work.

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Strong Sustainability by Design is being created via multiple versions that are being iterated over the course of two to three years. Planet Positive2030 is following a specific concurrence-building process where members contributing content are proposing “candidate” recommendations so as not to imply these are final recommendations at this time. This is also why the word, “Draft” is so prominently displayed.

Our Membership

Planet Positive2030, an initiative supported by the IEEE Standards Association as part of the Industry Connections Program, Sustainable Infrastructures and Community Development program (SICDP) currently has more than 400 experts involved in our work, and we are eager for new voices and perspectives to join our work.

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Methodologies - Table of Contents

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Global Methodologies

Future Vision

It is 2030 and the fundamental imbalance in the relationship between humans and the planet that was out of harmony is now in tune—the planet and all living beings, treated with respect and empathy as a starting point for all personal and civic activities, encompasses global technology and policy. Humans, animals, and the natural spaces they inhabit have become protected in multiple ways that champion the value of lived experiences, communities, and ecosystems.

The awareness of the need to prioritize the planet is present for the majority of people, reflected in their daily activities. Any activity that directly or indirectly involves the use of natural resources has been reimagined, optimized, and modernized to protect, respect, and regenerate the environment. This happened through an evolution in consciousness, a deep global awareness of humans' place in the systems of the earth, that respect and adherence to the idea of intergenerational stewardship of the world and for the generations of life to come that are now the norm. Regenerative design and sustainable practices and reports [e.g., United Nations Sustainable Development Goals (SDGs) and environmental, social, and corporate governance (ESG)] are used as standards with transdisciplinary collaboration. This applies to modern technologies during the creation, development, and mobilization of all products, services, and policies.

This informed agreement has only been made possible due to the identification of a set of methodologies; organized into a global network keeping the methodologies' inherent individual differences and richness. The implementation of this network has taken into consideration different local, regional, and global aspects respecting cultures, tradition, beliefs, and biodiversity across the globe. In this process, regeneration and resilience of Earth's ecosystems has begun and will continue to transform society, further enabling substantial progress toward reducing greenhouse gas (GHG) emissions, improving the social wellbeing of humanity.

Introduction

An underlying motivator for this work has been the concept of *Ubuntu* (ùbúnt'ù), a Nguni Bantu term for humanity, translated as "I am because you are," a philosophical belief in interconnectedness—a universal bond that connects humanity through sharing. A shift in mindset to Ubuntu, understanding global interdependence, restored balance and peace and brought happiness and prosperity to all living beings starting in 2022.

In that spirit, this message is offered from Chief Dwaine Perry of the Ramapough Lenape Nation:

> As we ponder tomorrow, let us remember our grandmother [universe] and begin now to help heal the trauma and degradation which has been visited upon her…for surely each wound, each careless and negative act visited upon Grandma is a scar… a wound visited upon our own health, our future and our children…let us use each moment of this time of restraints as a time to heal our families, our old wounds and our forgotten differences…This is a time to celebrate our humanity…The illness which permeates the atmosphere, impacting our health, may be part of the illness visited upon our Mother [earth]…May this be a time to renew our spirits. May we reflect on how to become better people – let us live with purpose, may we take the time to listen and understand…Be good to one another, let us live with love for one another. Be encouraged, let us emerge from this difficulty renewed in our traditions, that bring us joy. XwatAnushiik.

The current climate crisis requires identifying avenues for action with no delay. Action will not be perfect, but no action will lead to known devastating consequences. The usefulness of the collective positive planetary ecosystem's proposed recommendations depends on making them operational; with the implementation of ideas that lead to immediate action, change and transformation.

Issue: Lack of care

Background

Current economic and technological trends prioritizing quantifiable outcomes and consumption result in a lack of care for human well-being and sustainability of our planetary environment. Global, regional, and local methodologies for dealing with sustainability issues must do the opposite by embedding care into policies, agendas, expectations, narratives and behaviors. This would include consideration for various continental, geographical, and cultural backgrounds. This definition of *care* includes the well-being of all living beings and longevity of planetary health balanced with a commitment to global sustainability.

This concept of *care* expands the responsibility beyond traditional and modern roles and practices of caretaking (e.g., medical, family) to include all members, organizations, agencies, and institutions in global societies.

Care, in this context, is an ethical theory and practical imperative approach that emphasizes the importance of concern and responsibility for self and others rather than individual rules for compliance (i.e., deontology) or positive consequences for one group (i.e., utilitarianism). Although ethics is a central part in some professions (e.g., medical, legal) this description of care also involves broader applications within natural and social sciences as well as modern technologies. From a state perspective, care refers to the state's inherent obligations toward protecting individuals, especially for those in the ecosystem who are dependent and vulnerable, as described and addressed in the work of several social scientists and social justice activists (e.g., Elinor Ostrum, Rianne Eisler, Rigoberta Menchú Tum, Carol Gilligan, and Nel Noddings).

The lack of care is illustrated by a current trend in the economic marketplace where the majority of players believe competition is needed for survival. This capitalistic trend drives individuals and societies to focus on maximizing product sales and financial profits, which has caused negative consequences to collective human well-being and the living environment. With care as a foundation, success is measured by valuing the well-being of people, planet, and profit—for example, gross national happiness (GNH), and B Corp—versus measuring success solely by financial profit. For example, measuring for well-being and happiness (GNH) versus measuring success based on gross domestic product GDP

Science shows that humans are the primary cause for planetary damage; therefore, they have the primary responsibility for mitigation. Damaging factors include shifts to consumer-driven lifestyles, lack of sustainable strategies and structures to accommodate population increases, competing political perspectives, and an emphasis on financial profit (e.g., Daniel Christian Wahl, Dennis Meadows, Paul Polman, John Fullerton). Additional harmful drivers include exploitative economic practices, unequal access to advanced technologies, and other socioeconomic disparities and the need for new models of business practice[4] that consider wellbeing (e.g., James Rhee, Kate Raworth).

[4] This includes standards such as The IEEE Recommended Practice for Assessing the Impact of Autonomous and Intelligent Systems on Human Well-Being based on the Wellbeing Chapter of IEEE's Ethically Aligned Design.

Methodologies like Gaia 2.0 (i.e., planetary homeostasis) have explored the self-regulatory ability of Mother Earth (a.k.a. Gaia), which has been disrupted. The Gaia hypothesis states that living things form part of a planetary self-regulating system that has maintained habitable conditions for the past 3.5 billion years. In this context, the self-regulating capacity of Gaia 2.0 emerged within the earth's system and over time altered the climate and atmosphere by enabling the cycling of nutrients. This system operated organically, but the evolution of humans and technologies have interfered negatively. Earth "has now entered a new epoch termed the Anthropocene (3), and humans are beginning to become aware of the global consequences of their actions" (Bruno Latour, Gaia 2.0).

Recommendations

To achieve planetary well-being, we must work to validate the importance of care and proactively bolster care as a methodology that is at once universal and contextually defined through the following actions:

- **Increasing our valuation of care**: By validating and supporting existing care cultures, care professions, and undervalued caretaking work, policy makers can work against current narratives that downplay the universal importance of care. A shift is needed to work toward developing legislative measures and frameworks that foster care and well-being throughout societies into the future. It is important that this focus encompasses supporting human-facing professions as well as those professions oriented towards wildlife and nature conservation.

- **Prioritizing care over profit**: Systems that place efficiency and profits over all else are antithetical to care. To achieve planetary well-being, governments, corporations, and stakeholders must work to prioritize existing care cultures while proceeding with caution and moderation in developing automated mechanisms designed to provide synthetic care, for example, artificial intelligence (AI) chatbot therapy. In practice, this may involve working at the ground level (i.e., holding regular meetings with care practitioners) to understand how to better meet the needs of specific care providers rather than outsourcing growing care responsibilities to third-party systems (e.g., Artificial Intelligence Systems [AIS],). Here, augmented technology should be created/designed with an idea to empower people instead of replacing them.

- **Minimal market input:** To drive increased societal valuation of care, we must minimize the role that economic markets play in determining the worth of caregiving. Care for humans, animals, and natural spaces is a collective, longitudinal investment that does not typically lend itself to input–output models of capitalist production. To achieve planetary well-being, supporting and providing care must be viewed as a non-negotiable principle rather than an aspirational anomaly. A key question is how care will be valued and appreciated if it is disconnected from a transactional model with money (and money as a human construct that shapes the planet). For example, can the concept of currency be expanded to value alternative exchanges and interactions (e.g., personal time, carbon credits, etc.)? This will require metrics for human and planetary well-being as described in IEEE P7010.

- **Care as a universal value**: All creatures and spaces require some form of care. As such, it is important to center care as a moral imperative in ongoing discussions of emerging technology, ecological policy, economic frameworks, and updated human rights initiatives while working towards goals for planetary well-being. This includes care for the whole, greater, and the individual self, meeting one's own needs to be able to provide care to others to foster balance and equilibrium. The valuation of care previously engrained (e.g., Adam Smith's maximization principle of own utility/wealth and invisible hand processes in *The Wealth of Nations.* https://www.adamsmith.org/the-wealth-of-

nations, The Theory of Moral Sentiments, and How Adam Smith can Change Your Life) vastly misinterpreted the Darwinian narrative of "survival of the fittest," which Darwin revised to "survival of the most adaptable to change."

- **Care in context:** In recognizing the universality of care as a moral imperative, it is essential to highlight that care practices and norms are contextually defined. In recognizing care practices as locally derived, we can avoid the current proclivity for purporting homogenized ideals as the global standard (e.g., colonialism). Concepts of care that are diverse, rooted in indigenous and local practices defined by the communities can help avoid furthering [[the]] established colonialist practices.

- **Education:** Clarifying a definition of *care* to include social well-being and values that support the health of the planet and humanity will require outreach and education to invite engagement for this transformation. This also provides opportunities to educate and share knowledge of diverse topics and subject matter that increase learning of different backgrounds, experiences, and cultures (e.g., mindfulness philosophies, practices, and systems). For example, the integration of technology can be employed to support established Indigenous practices.

This responsibility argues that humans, through self-awareness, could make individual conscious choices alongside collective practices that could add to the earth's regenerative goals for self-regulation, which could become an effective framework for fostering global sustainability (e.g. Jane Goodall, Thich Nhat Hanh, Pope Francis Laudato Si, Daniel Christian Wahl).

Technological Insights and Recommendations

This space is intentionally left blank to encourage technically oriented feedback for public Request for Input.

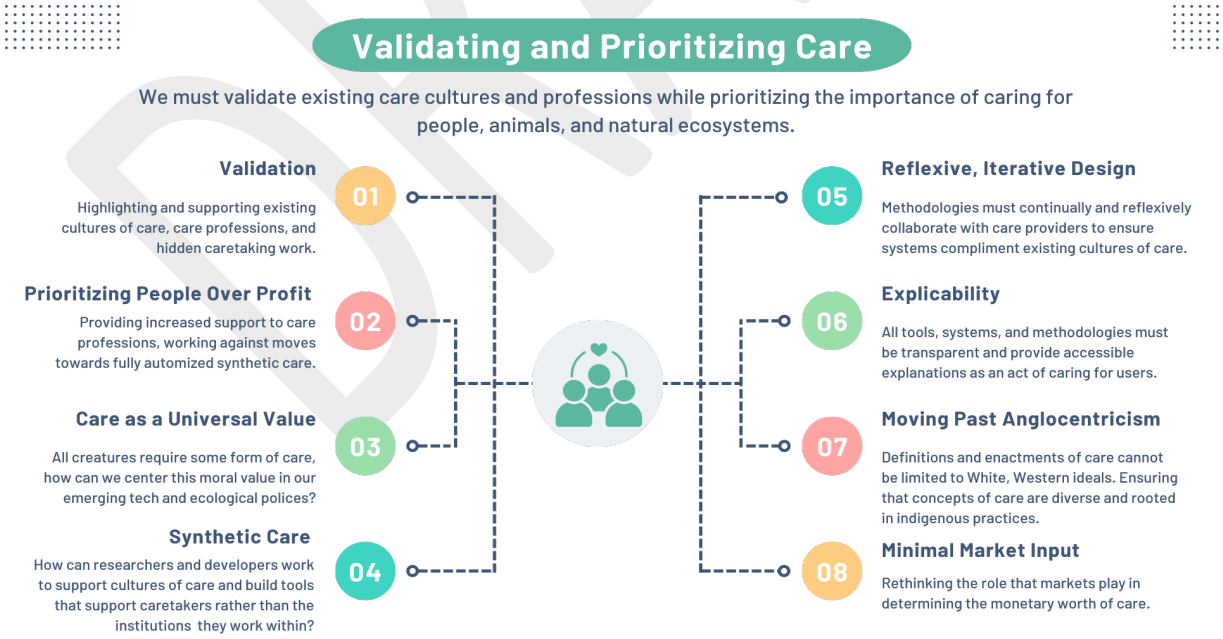

***Figure 1: Validating and prioritizing care (Image:** Allison Banzon Macey)

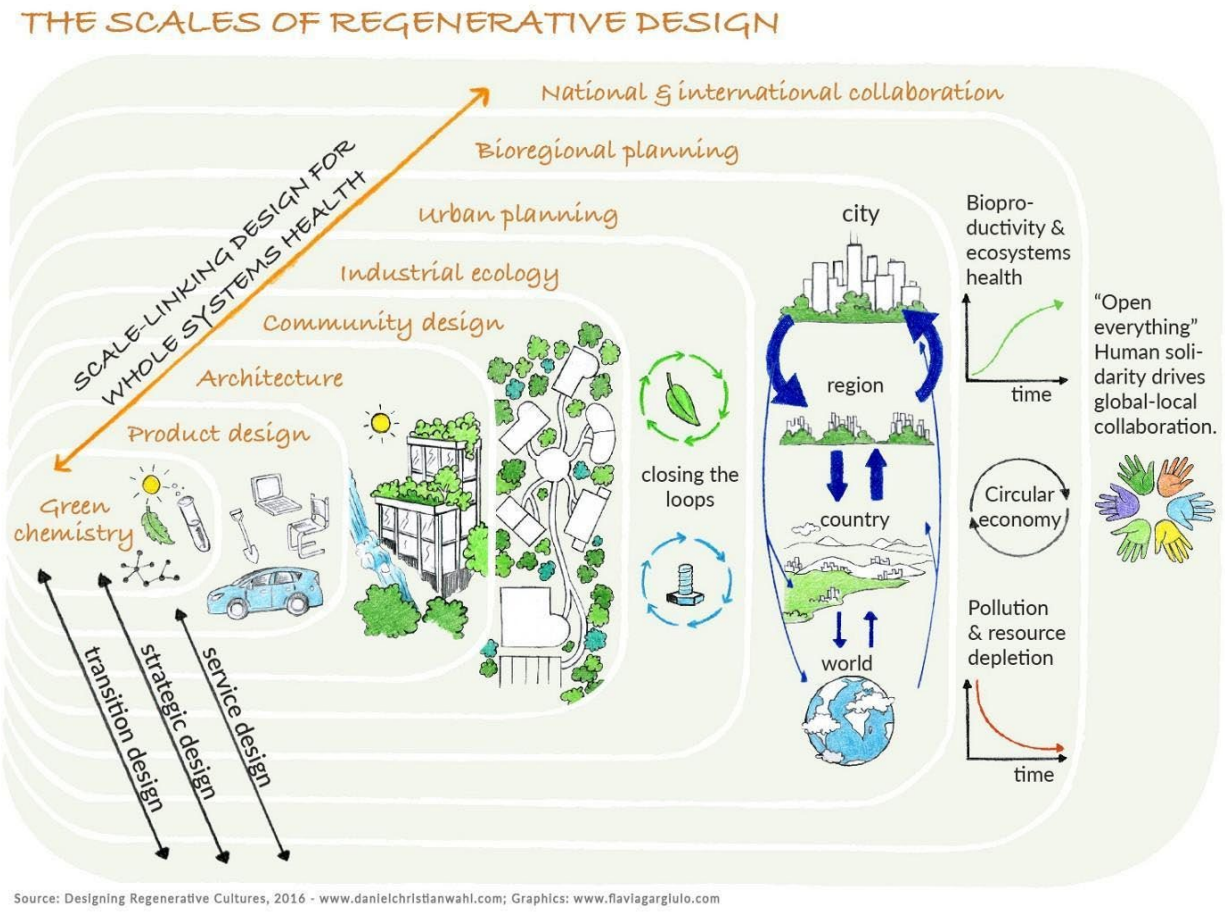

Figure 2:Designing regenerative cultures. Image: Daniel Christian Wahl, Designing Regenerative Cultures, 2016

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Issue: Need for transdisciplinary collaboration

Background

The novel and interconnected nature of the global challenges calls for a transdisciplinary approach for mitigation and repair. There is a need for holistic observation and analysis of the worldwide challenges in proper context. There is a need to identify and measure more accurately the impact of human behaviors and technologies on the well-being of humans and the living environment. Unfortunately, locally and globally, there is a tendency across sectors to compete and work in silos.

This leads to compartmentalizing disciplines, communities, and stakeholders when it comes to solving the complex problems of sustainability. As noted by Paul Cilliers,

> Some systems have a very large number of components and perform sophisticated tasks, but in a way that can be analyzed (in the full sense of the word) accurately. Such a system is complicated. Other systems are constituted by such intricate sets of non-linear relationships and feedback loops that only certain aspects of them can be analyzed at a time. Moreover, these analyses would always cause distortions. Systems of this kind are complex.

This idea is illustrated further with a list of characteristics of complex systems (e.g., a “snowflake is complicated, human brain is complex”).

This tendency of working in isolation also limits the emergence of regenerative solutions made possible through inclusion of people in discipline and knowledge areas not typically recognized or included in problem-solving spaces (e.g., Indigenous knowledge, social sciences, creative arts, and the lived experiences of those in the global South most impacted by climate change).

The global problems faced by humanity are interconnected yet often have been addressed separately by the people who work in individual fields of expertise typically related to the problem. For example, the problem of renewable energy is mostly being solved by engineers and scientists. For renewable energy to be effectively used by everyone, people who will be using it need to be involved and actively participate in the design process. This will require a balanced assessment of the pros and cons affecting each stakeholder community (local and global).

Consider “discipline” as ways of knowing or practicing. Many people are not considered to have the “acceptable” credentials to participate in the problem-solving spaces. Transdisciplinary collaboration can increase the problem-solving capacity by widening the field of experience and skills. Transdisciplinary (TD) collaboration mixes “disciplines” together to solve problems (e.g., pairing an electrical engineer and a native person from the Amazon). This includes stakeholders not recognized by some as modern-day professionals. For example, although not recognized by many in university-based professions as valid professionals, in regenerative design, Indigenous peoples are considered to be a source of the most useful knowledge regarding sustainability. Transdisciplinary collaboration also differs from other collaborative approaches (e.g., multidisciplinary, cross-disciplinary, and interdisciplinary). This emergent approach has the potential to unify branches of knowledge (e.g., technical, natural, social, and health sciences) to form something entirely new that the individual contributors could not create themselves.

To better understand the differences in disciplinary approaches, see Figure 3 below.

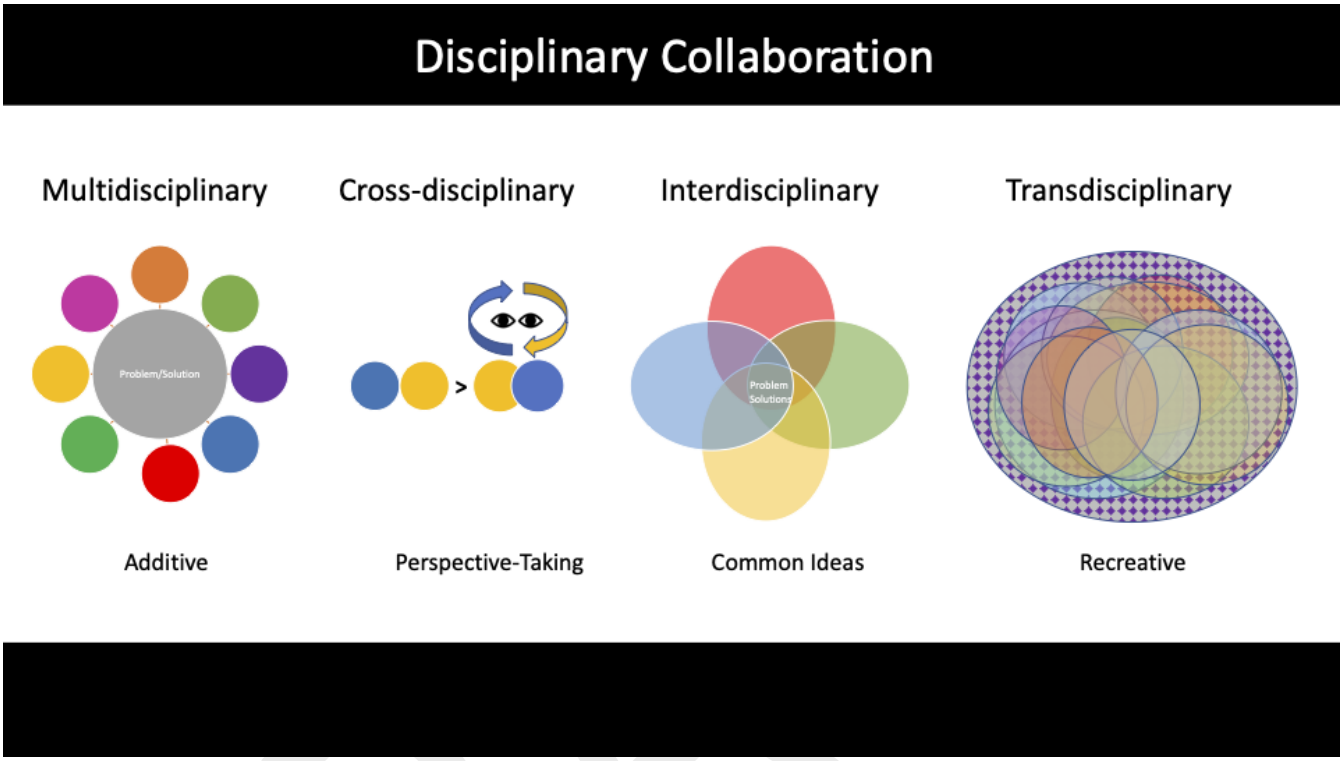

Figure 3. Image: Marisa Zalabak

Specific differences in disciplinary collaborative approaches are as follows:

- *Multidisciplinary* is additive, meaning that people from several different disciplines, domains, or groups remain within their individual boundaries (e.g., disciplines, specializations, and perspectives) and collaborate by adding ideas to the problem-solving space where the solution is determined by an assigned decision maker.

- *Cross-disciplinary* is based in perspective taking, where empathy is used to view the problem-space from another discipline's perspective while individual boundaries still remain. For example, an aerospace engineer considers the point of view of a behavioral psychologist and the behavioral psychologist considers the point of view of the engineer when designing the safety features of a plane.

- *Interdisciplinary* is consensus-based, where two or more individual disciplinary boundaries are crossed, like a Venn diagram, identifying a consensus (i.e., all collaborators agree on the solution to the problem). This leads to the creation of a new level of integration—while still remaining within each member's or group's disciplinary framework. Interdisciplinary collaborations can lead to the creation of a new hybrid discipline (e.g., neuropsychology). For example, neuroscientists, psychologists, and medical doctors who have different methods to tackle a problem combine them to find a collectively agreed-upon solution.

- *Transdisciplinary* collaboration, referred to as *xenogenesis* (i.e., between, across, and beyond disciplines), transcends boundaries, unifying individual disciplines, branches of knowledge, and/or intellectual

frameworks (e.g., technical, natural, social, and health sciences) to form an entirely new approach, unlike any of the contributing parts. It is a re-creative, emergent, regenerative approach. One key difference is the inclusion of all stakeholders (stakeholders often left excluded). Although transdisciplinary (TD) collaboration is often a messier and less predictable approach, some of the most innovative ideas and concepts emerge. The challenges of the nonconventional approach increase the need for regenerative processes during facilitation (e.g., stretch collaboration, psychological safety). This is an emergent process, and a single identified "field" or approach does not apply.

When using a TD collaboration approach, it is also important to consider social exclusion and the role it plays in limiting perspectives, knowledge, and experiences. Although the challenges facing our planet affect everyone, many people are not considered to have the "acceptable credentials" to participate in the problem-solving spaces. This applies as well to the ethical concerns with collaborations around designing, developing, and mobilizing technologies. With this in mind, TD collaboration can increase equity (as defined in Guiding Principles glossary) and problem-solving capacity by widening the field of experience and skill.

Transdisciplinary collaborations enable diverse collaborations to shine. As a booster for mobilizing innovation, these collaborations have the potential to:

a. Grow psychological resilience and flexibility for navigating unknowns and adversity (e.g., tolerance for ambiguity, ability to express one's point of view while being aware that it is a limited perspective due to one's conditioning and unconscious biases)

b. Reveal unexpected opportunities, risks, and leverage points in the collective field of effect

c. Create narratives that translate complex experiences into meaningful explanations and contributions while attracting and energizing others to join the learning journey

d. Increase experiential, educational opportunities through learning from and of others from different backgrounds, perspectives, and expertise

Recommendations

How we can facilitate effective transdisciplinary collaborations when collaborating in diverse groups seeking global solutions includes the following:

1. Establish restorative circles practices, an Indigenous practice of deep listening, ensuring all voices are heard and honored, increasing equity, trust, and psychological safety needed to:

   - Create new pathways for solutions to emerge.
   - Develop people's ability for navigating the unknown, an essential part of the transdisciplinary process. (e.g., tolerance for ambiguity).
   - Utilize and expand the practice of storytelling of circles by using platforms. These circles can also be continued through diverse platforms (e.g., Why It Matters app, WhatsApp, and Slack), attracting and energizing others to join the journey by enabling storytellers to share experiences of doing meaningful work.

2. Create collaborative agreements (social) that elevate and mobilize collective intelligence. This should be a "living" document, adapted and amended as needed throughout the collaboration to increase efficacy and meaning. This also serves to incorporate wisdom traditions and best practices for processing conflict

constructively. This can be extended to include methodological and technical agreements and protocols. This document will:

- Collect feedback for effective ongoing constructive collaboration.
- Help demystify the experience of working in a transdisciplinary environment for those who haven't experienced it.
- For an example, see Figure 4 for the agreement used by the Global Methodologies committee.

Figure 4: Community agreements example. Image: Marisa Zalabak

3. Increase equity in the process (e.g., language, gender, ethnicity, race, socioeconomic status, education, religion, and age). This includes establishing processes for collecting and sharing information.
    - Apply multimodal and multi-perspective communication practices between all stakeholders. This includes demystifying the language, concepts, and terminology used in technical professions when sharing information.
4. Consider what is being measured. Use of mixed methods (i.e., quantitative and qualitative combined) with a translation of how the quantitative data relates to the complexity of human and planetary well-being. Technologies centered around care are modeled after humans; it is important to be aware of who and what is being measured and whose lens is used to process the data. Note: One consideration is that technology is defined as separate from humans, although humans apply human skills as tools in daily life. Increase education on the causes and effects of climate change. For example, adopt other multimodal forms of communication as tools for weaving human connection and understanding, cognitively aligning and enabling effective innovation (e.g., storytelling, visualizations).
    - Create solid training models that can be adapted across cultures and backgrounds to reeducate and train a considerable percentage of humans on Earth toward a holistic lifestyle that includes care for

all other creatures on the planet and turn things around (e.g., regenerative design, life optimization, etc.).

5. Use AI and blockchain to create open and participatory platform solutions for transdisciplinary collaboration, unbiased collecting and sharing information, and tracking of issues and progress to better match resources with needs that have solid, positive planetary and financial impact. For example, using the World Intellectual Property Organization (WIPO)on patented solutions.

Technological Insights and Recommendations

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Issue: Technical barriers to achieving Regenerative Sustainability

Background

When proposing global methodologies for climate mitigation, it is important to consider technical barriers to achieving intended solutions. *Technical barriers* can be geographic, scientific, and technological. These barriers can affect the design, development, production, and mobilization of individual mitigation strategies. When solving complex problems with technologies, collateral damage can emerge at every phase of the proposed solutions from inception to completion, for example:

a. Materials and supply chains involved in battery-operated cars depend on batteries created with lithium, while the non-circular disposal and replacement of batteries can result in negative impacts.

b. The fossil fuels currently used to produce wind turbines may reduce the positive impacts of clean energy created by the turbines.

c. Dam construction in the Northwest of the United States initially produced low-cost, high-value electricity, but resulted in an expense to society by reducing the available food source produced by salmon fisheries.

d. The recycling of plastics are resulting in microplastics in hail and the atmosphere as well as other ways plastics have become embedded and integrated into natural ecosystems.

e. Manufacture of single-use plastics to create easily potable liquids and production of Teflon to keep tanks clean during battle result in plastic debris polluting the oceans and dispersing throughout the environment (i.e., wicked problems) and the exposure to forever chemicals contaminating the environment.

Technical barriers are complicated by a lack of continual real-time evaluation with protocols and metrics that effectively measure negative impacts on the well-being of entire socioeconomic systems (e.g., The Gross National Happiness (GNH) measure from Bhutan.). Another contributor to technical ineffectiveness includes barriers to implementation. Implementation of solutions for transforming the planet to regenerative, sustainable ecosystems. “Regenerative ecosystems are holistic and co-evolving, thriving through focusing on the wellbeing of the entire system (e.g., ant hills, rainforests, “circular” cities, or the human body, where the wellbeing of the whole system is reliant on the health of all its parts).” Regenerative businesses, societies and agriculture, mimic nature, connecting people to places, natural systems, and technologies.” This is also often sabotaged by human barriers and social pressures (for example, access to technology, lack of resources, energy sources, political conflicts, economic preferences for profit and gain). Although some barriers to mitigation can be effectively solved by technology, these approaches can conflict with current socioeconomic systems in place around the world.

Global methodologies are still developing. No single methodology can address the entirety of diverse global societies, environments, and natural world issues. Many of these methodologies are originally proposed in silos—they have no clearly defined links to connect them. As methodologies develop, links that integrate objectives, strategies, targets, metrics, and impacts need to be refined.

As new technologies are discovered to improve mitigation it is essential to understand the potential impacts outside of the focus area. For example:

a. In the shipping industry, there is movement to ensure that the design of every ship must consider the entire life span of each component so that ships that are retired won't show up as trash in another part of the world, perpetuating the problem.

b. The use of plants to replace biofuels may result in food shortages, poor food quality, or inflation.

c. The communications technology created to provide more access and connectivity globally can end as electronic waste in landfills, damaging the planet.

Because of these potential negative impacts, we need to be mindful of existing gaps and barriers that inevitably occur whenever different technological concepts, languages, methods, and disciplines interact. As a consequence, some of these gaps prevent effective technical solutions from being globally applied. If a community cannot understand the technical concept and implications of a solution, they cannot apply it themselves or keep it running sustainably after implementation. For example, different climate change forecasting models (including formatting and data collection) do not always have shared languages and methods. They sometimes result in conflicting predictions when applied in diverse geographic locations.

In addition, unpredictable challenges can surface as technologies evolve without their long-term vetting (e.g., cost-benefit analysis or life-cycle effects), for example, cobalt used to mobilize electric vehicles resulting in disposal and mining issues or sulfur dioxide seeding to improve reflective qualities of the atmosphere and cool the planet resulting in acid rain. Careful vetting is also often limited by a lack of shared information following negative technical incidents (e.g., registry). Although the nature of vetting can require countless rounds of experimentation for improvement, it can provide the necessary guardrails to prevent significant negative, unintended impacts. When well vetted in partnership with governmental support, like smart farming systems, technologies can improve efficiency and reduce resource consumption with minimal negative side effects.

Recommendations

To address technical barriers that inhibit achieving a positive sustainable turnaround by 2030, major global methodologies should be linked and integrated through meaningful and practical objectives, strategies, targets, and metrics. Consider Malcolm Gladwell's description of the *tipping point:* the "magic moment when an idea, trend, or social behavior crosses a threshold, tips, and spreads like wildfire" and the following:

- Create a global communications campaign to incentivize outreach between organizations and entities for exchange and collaboration.

- Align the technical standards used by global entities to proactively drive the integration of the various methodologies.

- Leverage AI technology to create maps of methodologies that identify the domain concepts and the relationships among them to harmonize them across domains and dimensions (as illustrated in map included later in this chapter), including the following:

  - Ensure that the development of global maps of methodologies considers that a methodology that works in one location does not always work well in another. Allow for context-specific, community-driven, and localized application of methodologies.
  - Utilize AI applications to match organizations and individuals and improve communication of shared goals, connecting the purpose of initiatives in alignment with the sustainable development goals (e.g., SDG and ESG).
  - Create maps or detailed registries of wicked problems discovered in vetting and deployment, including notable incidents in time to prevent future damage (e.g., "test and invest", IEEE P7010 Well-being Metrics Standard).
  - Create applications for wicked problem prediction and mitigation.

- Create incentives and systemic reminders (i.e., nudge theory and choice architecture, discussed by Richard H. Thaler) at the government level to encourage cooperation and collaboration between technical entities and stakeholders to achieve holistic innovations (e.g., organizations, institutions, agencies, businesses, nonprofits, communities, and individuals).

- Provide some form of valuation/metric for each methodology that communicates the success of the methodology, and consider the following:
  - Create deterrents to avoid innovating for things that are not really necessary. For example, reduction in production may be a solution because it seems like we continue to create products, run into caused issues, then create rules and regulations to minimize those issues. We keep doing this in cycle after cycle into eternity, while no amount of knowledge and advancement has helped us find a sense of contentment and "enoughness." We have become an "issue-creating issue-solving species" that can potentially never be satisfied.

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Issue: Human barriers to achieving Regenerative Sustainability by 2030

Background

Since technological barriers are so often interwoven with human capacities to solve problems in diverse paradigms, advantages and disadvantages emerge together that must be considered. The complexity of human diversity—individual, collective, and social (e.g., socioeconomic, cultural, political, and geographic realities and experiences)—presents barriers for coordinated actions that lead to effective outcomes. While we face global challenges as humans living on the same planet, like climate change, the place in which we live influences how we can solve the problem. To better understand and apply appropriate interventions and mitigations it is essential to use methods and approaches that are capable of differentiating needs, causes and effects. For example, “Location intelligence” (e.g. Life Map) and other methods that research the specific energy consumption in each location, energy consumption resulting from natural systems and technologies (e.g. AIS).

A lack of social coherence also plays a big role in continuing destructive social behaviors, calling for applications for mitigating conflict and increasing peacemaking within, between and across local and global boundaries. Conflicts fed by perceived threats to basic psychological human needs (safety, security, etc.), too often result in natural reactive behaviors (e.g., fight, flight or freeze) driven by emotions (e.g., fear, anxiety, anger, sadness).

Political norms in varying countries also influence the ability to create change. In some countries, citizens have the power to create movements of change (e.g., a democracy), while in others the ruling party controls what can be done. In addition, political norms, cultural norms, socioeconomic structures, and psychological factors affect the ability to inspire people’s minds to change (e.g., see Jared Diamond: Collapse). Positive change in behaviors and social practices require new mindsets that deeply engage all levels (e.g., individual, social, industrial, communal) accounting for the interconnectedness of all life and elements on Earth. As Bernard Shaw wrote, “Progress is impossible without change, and those who cannot change their minds cannot change anything." As described in our first Issue, *care* is of universal relevance. Despite all contextual and cultural differentiation, care is a golden, connective thread. A collection of effective methodologies is necessary to support cooperation and combined efforts to meet these challenges and realize the aspirations for planetary well-being.

As data-driven technologies scale and exploitative economic practices have grown unchecked, cultures of care (as described in our first Issue), continue to be diminished. Prioritizing quantifiable outcomes over well-being (e.g., GDP vs GNH) inevitably leads to a decline of cultures of care across public and private sectors, resulting in challenges to human and animal rights as well as the preservation of natural spaces. In addition, the proliferation of misinformation increases divisiveness that hinders changes in behavior.

Fortunately, some methodologies bridge Indigenous wisdom traditions, effective for thousands of years (e.g., Seven Generations and Ubuntu) to newer methodologies (e.g., conscious capitalism, Doughnut economics, and B Corp Certification). Currently, with a few expectations, most of these methodologies exist in silos and do not capitalize on the vast overlap, potential synergies, and possible symbiotic relationships. While the UN Sustainable Development Goals (SDGs) represent the biggest global attempt to bridge silos for sustainable, life-promoting policies today, there is still a lack of consensus that negatively affects meaningful action. For

example, divides exist for many corporations and government entities. There are those who prefer to base their actions solely on environmental, social, and corporate governance (ESG) metrics versus the SDGs, preventing aligned actions. For example, most ESG metrics valued by business enterprises do not encompass the needs of the entire ecosystem (e.g., farmers, schools, not-for-profit services). In addition, methods that are currently recommended as roadmaps (e.g., SDGs) have evolved and will continue to evolve from their original forms. Consequently, no single framework or methodology will be sufficient.

Within the wider context of global knowledge (e.g., sociology, geography, and regional sciences) there are two distinguishable factors: individual and environmental. *Individual* relates to the personal experience of a human being within day-to-day parameters, while *environmental* relates to external events, which may affect wider groups, regions, and nations. The interaction between the individual and environmental spheres is where impact resides, raising the key performance indicators (KPIs) every iteration, so that each methodology is more ambitious than the one before. This can be exemplified by the current European Green Deal, which targets much more ambitious goals as opposed to the plans in the prior programming periods. But there is little emphasis on the societal processes and behaviors that need to occur to translate these targets into concrete actions.

There are several layers of considerations, which impact the implementation of various frameworks and contexts. There is an initial local context (e.g., individual or environmental), the regional geographic context, and the global context. Each of these present a different space for implementation of green methodologies and technologies that may present a new wave of challenges. In addition, the temporal nature and regional context of methodological approaches are barriers for implementation, which include traditional geopolitical competitions that prevent countries from working as true global partners.

Other major barriers to achieving the goals of planetary well-being include human perceptions and biases based on personal locations, habits, cultures, beliefs, and educational backgrounds as well as political and social preferences. Although diversity is an advantage socially and biologically, aggressive differences and lack of consensus can result in little or no action. Despite often cited climate change skepticism, the UN Peoples' Climate Vote demonstrated that a significant percentage of the world's population is concerned and shares the desire to live in a sustainable and responsible manner.

An additional hindrance is created by the financial concerns and incentives driven by old models for profitability. Even though a sustainable-oriented business may be created with the best intentions, in the end it is often taken over or merged into large profit-driven corporations (where many prioritize exponential growth models measured primarily by fiscal metrics in isolation, rather than including metrics for human and planetary wellbeing). Often this forces smaller, sustainable businesses into luxury niches that few people can afford (e.g., the merger of European chocolate companies). The lack of models or profit with purpose that fit within the constraints of sustainability (e.g., Doughnut Economy, Net Positive) also hinders progress.

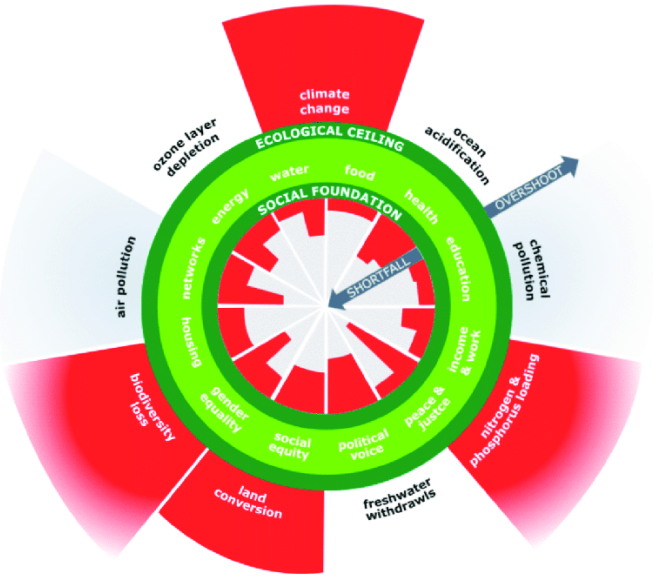


Figure 5: Doughnut economics: Image permission, Creative Commons.

A barrier to change is individuals' mindsets, due to limitations of current mental models created by personal experiences and self-reinforcing habits learned over a lifetime and mental models and belief systems developed over time by life experience. This results in blind spots, making it difficult for individuals to see clearly and objectively—to say what they think, do what they say, and see what they do.

Conflicts occur individually, interpersonally, and socially given the reactions to threats created by climate change. Understanding basic human psychological needs (i.e., safety, security, belonging, respect, love, and self-actualization) is essential. Many reactions, although presented as opposition to taking action, are based in fear and sadness regarding the effects and potential consequences of the climate warming.

A fundamental shift in mindset is required to overcome these barriers. A shift is required to a more holistic approach, where sustainability is inherently valued, is a core expectation, and is measured, monitored, and designed accordingly, both for compliance and to drive sustainable innovation. In order to shift paradigms of entrenched mindsets, deeper levels and methods of learning are required to develop awareness of other belief systems and holistic thinking. These deeper insights can lead to seismic shifts of perception and effective consequential action.

Recommendations

What is urgently needed at this point in history is coordinated action via all existing sustainability-oriented methodologies alongside improving human factors that impact processes. Linking these methodologies and technologies in a meaningful and pragmatic manner is paramount for reaching the tipping point for a positive turnaround (see mind maps discussed in a later Issue).

In order to benefit from the establishment of technologically advanced and environmentally conscious societies, observe the following:

- When implementing processes, information about proposed improvement iterations should be made accessible to as many affected stakeholders as possible, reaching all levels in societies. Engagement at all levels to improve the impact of the various goals and innovations is paramount.

- To engage more people, impact assessment reports will be needed, differentiated by target, goals, and focus of impact. This includes the need for the impacts of current and proposed technologies.

- Education in sustainability and climate change must be incorporated in general pre-k to 12 education and in every sector of society for all generations.

- Democratization is needed in data-driven technologies to foster global creative societies (e.g., Society 5.0). To achieve this democratization, individuals' data should be made available to them as owner and access and use granted by them.

- Create methods to bridge differences and gaps in communication between diverse demographics (e.g., semantics) and provide access to conflict management and peacemaking.

- Adaptation and mitigation.

- Create systems and processes to address misinformation driven by personally and/or politically driven actors intending to mislead the general public about the realities of climate change.

- Create programs/approaches to address ecoanxiety: (locus of control) and binary and nonbinary thinking including the following:
    - Incorporate a range of practices for constructive conflict mediation. This includes Indigenous cultural and religious practices, as well as practices from social sciences that create opportunities for conflicts to result in a win-win outcome versus a temporary compromise. This includes empathetic listening, establishing a shared language for conceptual understanding, respect for individual, cultural and religious values, and distinguishing between what is wanted and what is needed by all parties and the community involved. Some examples include Indigenous-based restorative circles, "Original Ways of Knowing," nonviolent communication, relational thinking, and the United Nations General Assembly. One example of a technical augmentation is an app created by Million Peacemakers to help users apply empathic, perspective-taking strategies in daily life to mediate conflicts constructively.

- Regarding mindsets: A fundamental change in the mindset of individuals, communities, and nations is required in order to overcome their blind spots, to let nature work, and to reestablish and unleash the capacity for self-healing. The following is an example:
    - Applying the Presencing Institute model, Theory U. Theory U has been utilized by the United Nations Development Coordination Office together with the Presencing Institute in 2021 to assist 14 countries in the adoption of the UN Sustainable Development Goals (SDGs) to advance the UN Agenda 2030. Theory U is used to counter illusive, unhealthy, ego-driven social habits. In support of developing a heightened sense of systems thinking through complex systems, Theory U fosters collaboration and action learning by encouraging the creation of new prototypes that help to identify different levels of the emerging knowledge and understanding and how consequential action comes into being. This approach supports authentic change by:

        1. Holding spaces for deep listening

2. Observing while suspending judgment

3. Sensing what is occurring with an “open mind, open heart, and open will”

4. Increasing participants’ ability for “presencing,” the capacity to connect to the deepest sources of self and to access an inner place of stillness where inherent “knowing” is more able to surface

5. Crystallizing and committing to a shared purpose

6. Prototyping, which involves integration of thinking, feeling, and will in the context of practical applications and learning by doing

7. Coevolving as a group, convening the right sets of players to help them to co-sense and cocreate at the scale of the whole

Figure 6: Theory U

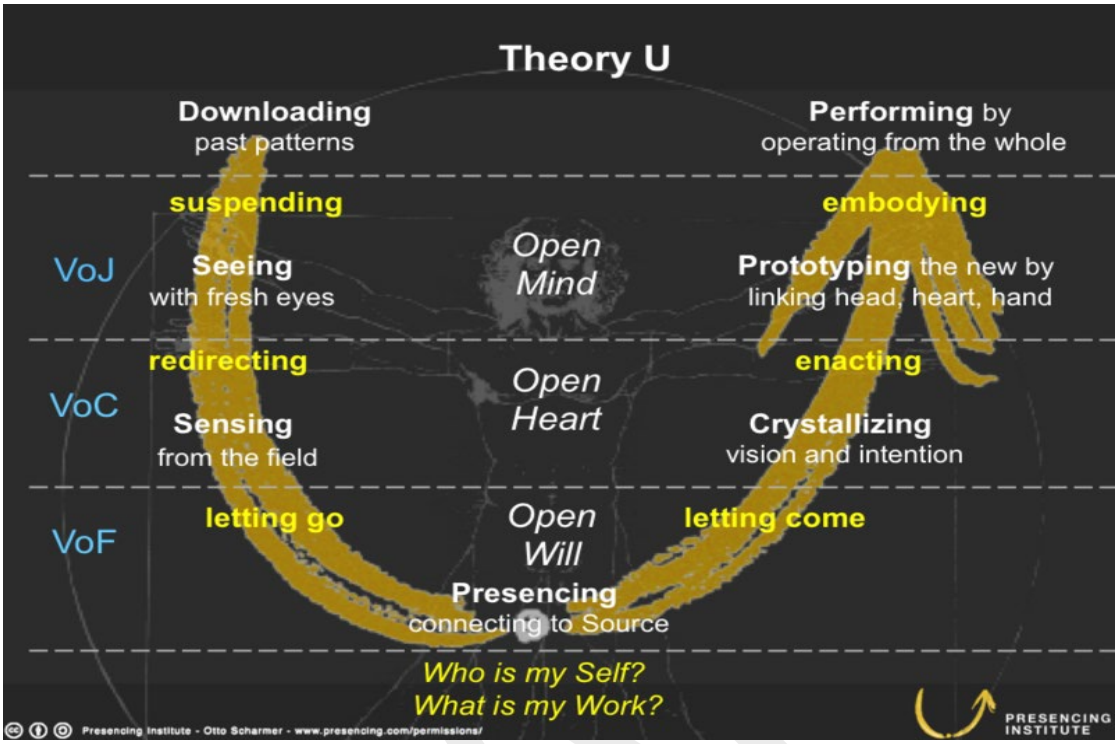
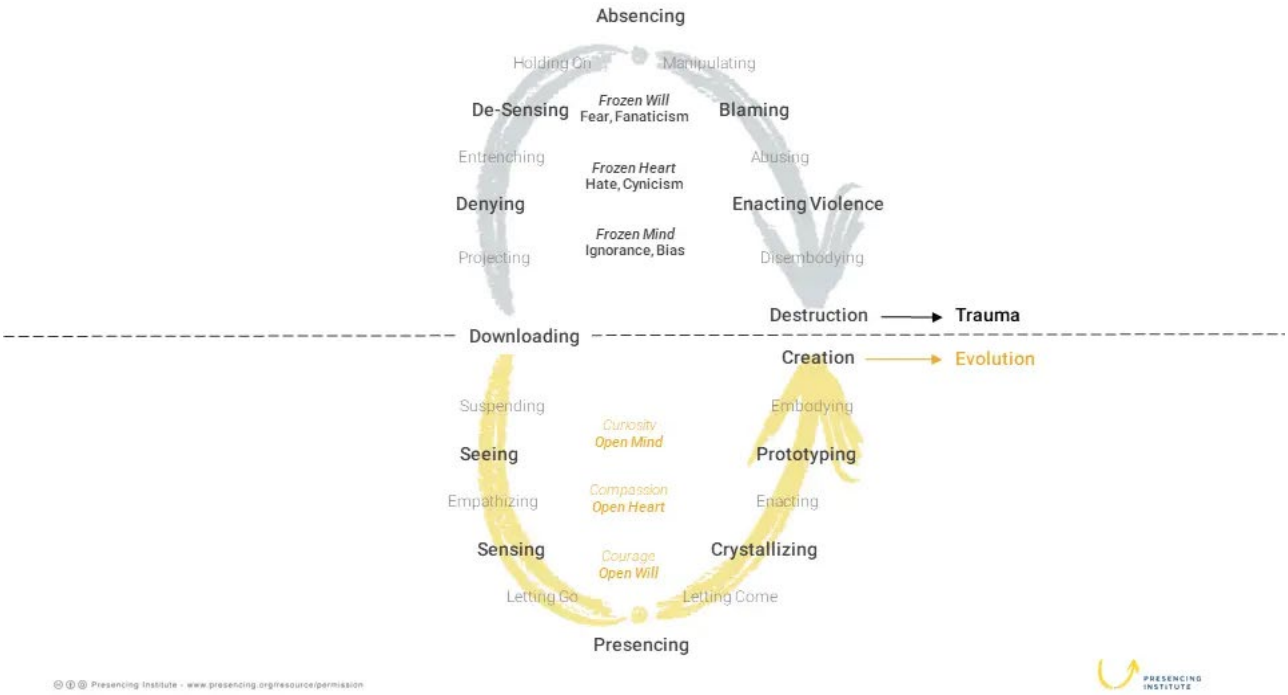


Figure 7: Theory U—Presencing and sensing process



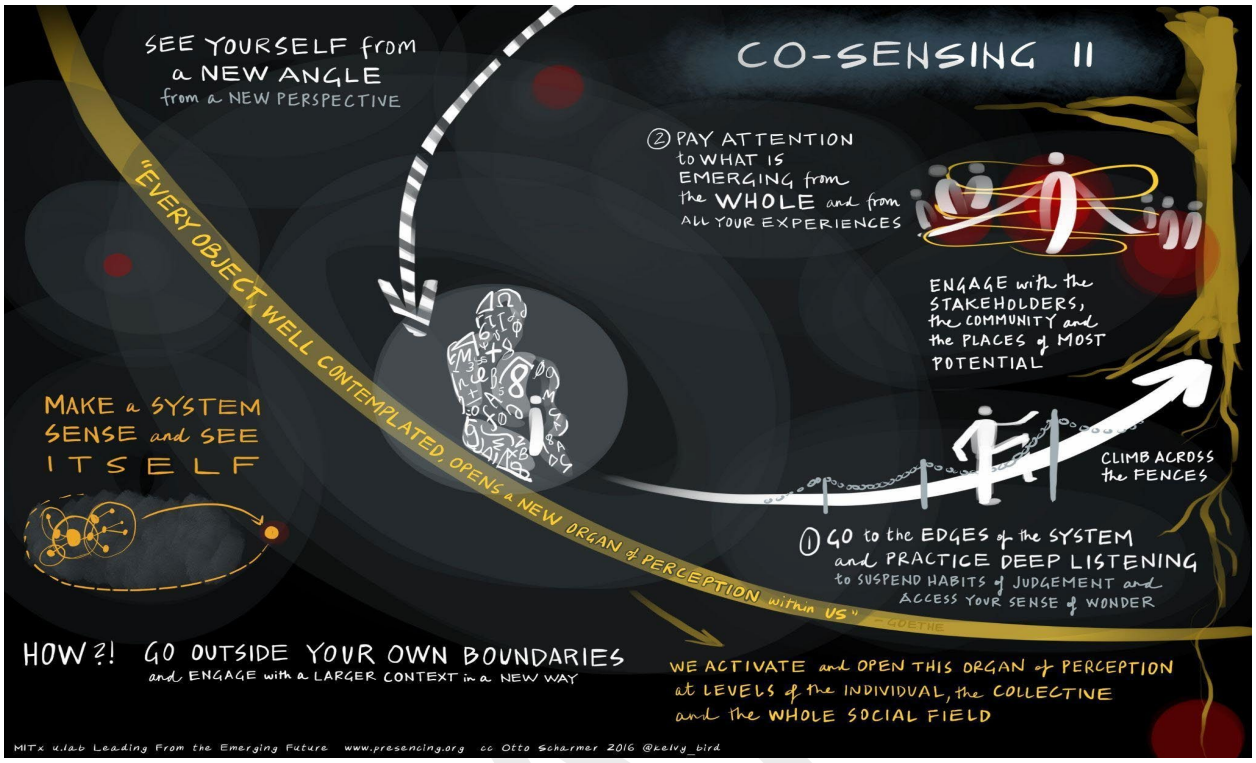


Figure 8: Theory U—Co-sensing

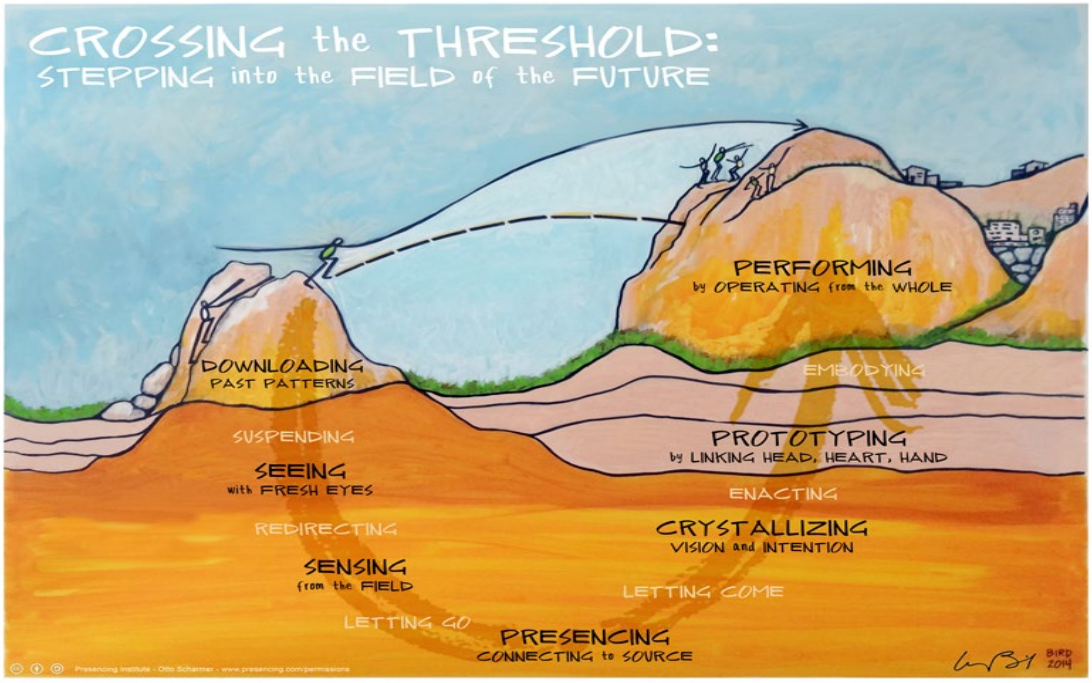


Figure 9: Theory U—Stepping into the field of the future

Technological Insights and Recommendations

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Issue: Lack of linking and mapping

Background

Since technical and human barriers are linked, there is a difficulty in achieving consensus and resolving divergent priorities when selecting plans, policies, and actions to achieve the objectives for planetary well-being (e.g., reducing GHG emissions) and improving the well-being of a global population.

The participating stakeholder communities are expected to be large and very diverse. As a consequence, considerable resources and supporting methodological protocols and tools should be made available to facilitate obtaining consensus and consilience among stakeholders (e.g., among advocates, practitioners, and nontechnical people and cultures). This includes metrics that accurately reflect ongoing effectiveness.

In addition, with the lack of effective tools, the complexity of connections between social and technical aspects of interventions is often unclear and difficult to comprehend. The diversity of human and environmental factors—as well as the evolution of technological advancements—calls for effective tools (e.g., maps, libraries) that support visualization and comprehension. For example, tools are needed to fully understand the impacts of specific geographic regions and environments in designing effective towns and cities (such as critical regionalism).

Ongoing accumulation of this kind of knowledge is critical. For example, Project Drawdown, one of the most current successful approaches for mitigation, has recently introduced a library of effective methods and solutions for a diverse global audience; they are encouraging others to contribute by proposing additional tools for sharing information.

Recommendations

The difficulty in achieving consensus and resolving conflict can be minimized through technological and non-technological solutions. Some proposals are as follows:

- Create and expand a methodologies systems mind maps (for an example, see Figure 3 below) with updates of emerging methodologies (e.g., Project Drawdowns' solutions library recently added to the Project Drawdown approach or Edward Darling's LifeMap with CODES Action Plan).

- Improve and create networks map of global methodologies, including the methodologies used globally for specific branches and purposes that align to the overall purpose SDGs. Build in a process to reassess inputs and outputs, including human behaviors.

- Identify and map effective applied methods that support the focus of each specialized focus area (e.g. cities & towns, villages, lakes, metrics).

- Create appendices glossaries and indexes supporting clarity and communication, to increase inclusion of diverse stakeholder groups with real-time updates.

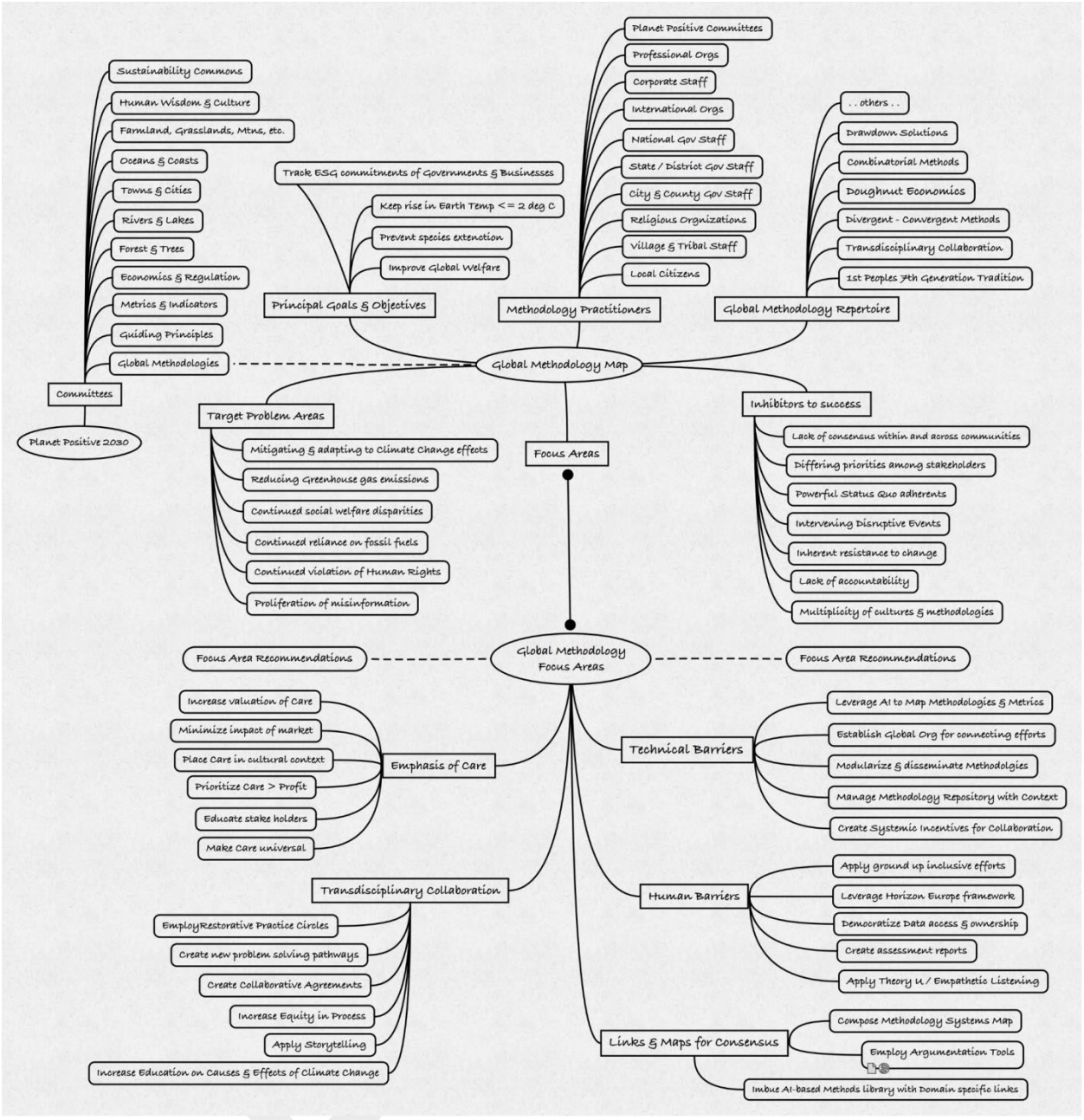

***Figure 10. Methodologies Systems Mind-Mapping. Image: Mike Houghtaling**

- Including destination-specific approaches as the maps evolve with innovation and geographic changes. This is already an approach ingrained in the Horizon Europe framework with its destinations and ground-up approach, that ought to be present within the implementation of private and public green strategies as well as the growth of green technologies. For example, a destination-specific approaches like [critical regionalism in architecture.]

Technological Insights and Recommendations

This space is intentionally left blank to encourage technically oriented feedback for public Request for Input.

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