



EarthXDesign for a Sustainable World: Moving from Human-Centered to Earth-Centered Design

By Tina Grotzer and Lydia Cao

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Design thinking has gotten a lot of attention in the recent past. It is a key element of innovation and is critical to thinking about possible futures in a volatile, uncertain, complex, and ambiguous (VUCA) world. How we guide the design process matters a lot for the viability and feasibility of the resulting products. But it also holds implications that extend beyond the particular problem that the design seeks to solve—the unintended consequences, so-to-speak.

Early work on design, such as that from the Stanford Design School and IDEO, involved a set of steps that reflected thoughtful practice. This work grew out of research on how creative thinkers approach problem-solving in the teaching of thinking literature and programs such as Creative Problem-Solving (CPS) by Osborn and Parnes.¹ More recently, the field has offered variations of design skills such as those developed by researchers at the Stanford Design Library that include mindsets and processes for effective design thinking,² including, for instance, attitudinal perspectives such as embracing ambiguity, synthesizing information, and rapid experimentation.³

Human-Centered Design Has Had a Powerful Impact on People’s Thinking

One of the most prominent frameworks in the design space is Human-Centered Design (HCD). This approach positions human experience at the center of all aspects of the design and innovation process to ensure that designs work well for their audience and result in successful adoption. HCD encourages empathy for the perspectives of the users, and through feedback, can result in iterative improvements towards greater adoption and towards more useful products.⁴ The notion of Human-Centered Design emerged as a response to a function-centered approach based on designers’ perceptions of what was needed rather users’ experiences, which often resulted in difficulty, frustration, confusion, and errors when using the product.⁵

IDEO, the well-known innovation and design company, and a leader in HCD, uses these questions to illustrate three pillars of what it means to design with humans at the center as follows: 1. Desirability: What makes sense to people and for people? 2. Feasibility: What is technically possible within the foreseeable future? And 3. Viability: What is likely to become part of a sustainable business model? According to IDEO, “design thinking is a human-centered approach to innovation...[bringing] together what is desirable from a *human* point of view with what is *technologically* feasible and *economically* viable.”⁶ IDEO specifically creates human-centered products—including services, spaces, and organizations. Even so, IDEO works on complex problem spaces related to big challenges such as food waste, food insecurity, education, environmental issues and so forth. It is not a company that shies away from fuzzy, complex, ill-structured problems. So, human-centric design is what we need to help humans, right?



Human-Centered Design Is the Wrong Lens for a Sustainable World

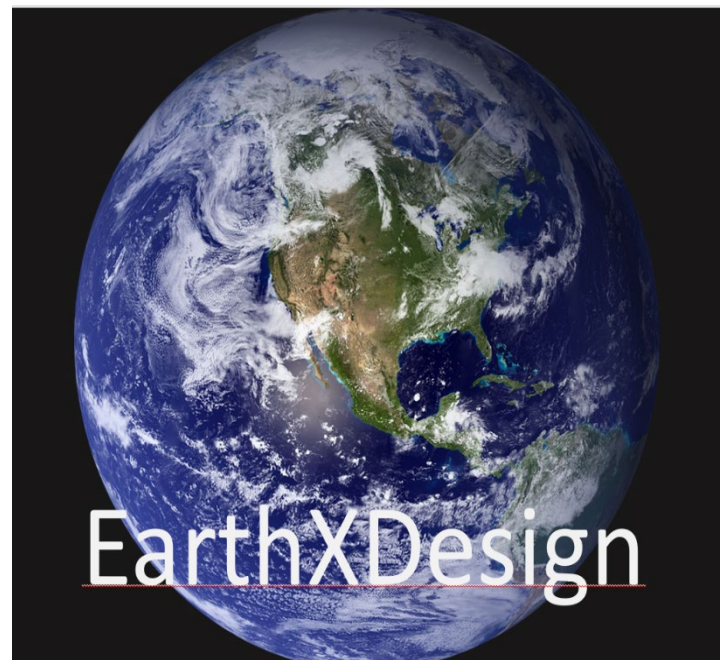
Well, except for this.... Everything single aspect of our lives, our history, and our possible futures is tied to the planet that we live on—every aspect of our well-being and happiness depends upon our small blue planet. The habitability of our planet is the result of an amazing confluence of events. We have been living in that confluence in past decades—just enough carbon to keep us warm enough but not too much so that we dangerously overheat. The question about whether a “human-centered design lens” is the best way to innovate when it comes to the issues that we currently face and that the next generation faces is perhaps one of the most critical questions that we will ever ask. All of human endeavors, including Human-Centered Design, now and into the future, face an existential threat unless we attend equally to Earth-Centered Design and humans as members of the planet.

HCD has enjoyed huge success and is widely applied across sectors. However, the research on design thinking and creativity is not well-integrated with what we know about innovation related to the climate. The success and progress of HCD has led designers to treating it as the go-to method and supports a misleading sense of optimism that we can design our way out of everything with Human-Centered Design.⁷ Wakkary has thus challenged HCD and has raised the critical question of “What if human-centered thinking (and its underlying humanism) is not the answer to these problems but rather, in its dominant role, may be part of the problem?”⁸

HCD may be helpful in terms of getting people to adopt innovations, but it may not serve humans well in living sustainably and in a green economy. Here we are arguing that it is a problematic stance for living in a green world, for encouraging eco-innovators, and for developing designs that lead to a sustainable world. The problem is that it neglects the planet—relegating it as a backdrop or an add-on to the design equation! We call for a paradigm shift, for moving from a human-centered design approach to an earth-centered one, that puts Planet Earth at the center and consider humans in relation with the planet.


What is EarthXDesign and Why Do We Need it?

We use a few different terms to refer to design that puts Earth at the center. These include “Earth-Centric” and “Earth-Centered” which we use interchangeably to refer to design that centers on the earth first. Importantly, these include humans as inhabitants of Earth who benefit from a habitable planet, but it does not elevate their needs over the planet and its other inhabitants. We use these terms in direct contrast to “Human-Centric” of Human-Centered Design which we use interchangeably. We refer to the general paradigm shift as moving to EarthXDesign in order to contrast with the popular term UX Design which focuses on User Experience. Another term that we use is “Earth Resonant.” This term refers more generally to actions that fit with the dynamics and workings of the planet. It can include design moves, modes of living, and behaviors that are in synchrony or in coordination with Earth.



In contrast to Human-Centered Design, Earth-Centered Design considers design from the perspectives of earthlings, including humans, and evaluates feasibility in terms of what is in alignment with the limits and dynamics of the earth. It considers viability in terms of well-being rather than financial gains. Revisiting IDEO's three questions, we reframe them as follows: 1. Desirability: What is desirable for earthlings, including humans? 2. Feasibility: What is feasible in alignment with the limits and dynamics of the earth's ecological systems and processes? And 3. Viability: What is viable in the long-term that contribute to the well-being of all earthlings?





Why do we need EarthXDesign? Innovation and design in all aspects of life will be essential for continuing to meet the challenges of a warming planet. While there are approaches to innovation and design, much of it is human-centric and not particularly well-suited to issues of sustainability and the climate crisis. Human experience depends upon Earth systems and dynamics. The climate crisis requires new, high leverage forms of broad innovation in terms of non-local approaches, autonomous adaptation, and contextualized design based on local - culture, circumstances, and needs. Existing research on creative thinking can be leveraged to inform earth-centric approaches to design.

HCD and ECD have different priorities that sometimes put them in conflict. (See the Table Contrasting the two.) However, the priorities of humans and the earth should align rather than compete. Ultimately EarthXDesign encompasses human needs by adopting a longer view of what ultimately serves both Earth and humans and by defining needs as connected to sustainable life on Earth. The purpose of EarthXDesign is not to put it in opposition to human-centered design, but rather to help us to rethink that it means to put the earth at the center.

Moving from Human-Centric to Earth-Centric

While Human-Centered Design begins with empathizing with the intended users of a product or design by engaging potential users in interviews, observation of how they carry out tasks, and identifying challenges or problems that arise, EarthXDesign begins with studying activity spaces and places challenges into a longer time horizon and more expansive spatial framing. It seeks to understand human and non-human participants in activity spaces but then goes beyond those spaces to understand their placement in concentric circles of engagement. It asks a set of questions to analyze *how Earth Resonant* the features of a design are. These include:

- Does it include consideration for the planet? For non-human inhabitants of the planet? Or only people?
- Can it be sustained over time? Does it introduce new problems?
- Are implicit assumptions revealed/analyzed/re-considered? Turned inside out?
- Are the extended, possibly unanticipated effects traced out and considered?
- Does it address sensitivity, ability and inclination to enact behavior change?
- Does it address environmental issues? Injustice issues? Health issues?
- Do you see paths to acceptance by those who might adopt the innovation?
- Are there opportunities for autonomous adaptation? Local wisdom? Centralized, but non-local expertise? An integration of the two?

What does the contrast between HC And EC Design look like? Let’s consider an example of how each focus might play out. Dealing with temperature extremes will increasingly play a role in the comfort and survivability of Earth’s inhabitants as the planet warms. Human-Centered Design would focus on humans experiencing the climate swings. One might observe that at some points in time, they are seeking more warmth and at other times, they are seeking to cool down. Investigating the problem space might lead designers to realize that environmental variables such as where in a building people are living makes a difference and that they tend to have different preferences for how warm or cold they prefer to be. One might try to mitigate these challenges by building in features such as flexibility and adjustability in the design solution to allow for individualization, such as installing portable mini-split air conditioning and heating units. While heat pumps are fairly energy efficient, adopting this solution on a broad scale contributes to greenhouse gases that exacerbate the initial problem unless the units are designed to use solar.

Adopting a longer time horizon, Earth-Centered Design considers what has been happening over time in relation to planet Earth. By placing the problem into a longer spatial-temporal frame, it emphasizes that the habitability of the planet is changing and that human inhabitants need to look for earth-resonant approaches to increasing habitability for themselves in ways that don’t exacerbate the dynamics that lead to their discomfort in the first place or that speed up the onset of the challenges. They need to seek solutions that acknowledge and respect earth dynamics and their relationship within them. This means seeking solutions that do not contribute to temperature extremes and seeking approaches that mitigate the issues on as many levels as possible. One’s relationship with Earth and its dynamic patterns becomes a central focus. An EC Designer might seek a different building design over non-systematic patches that exacerbate the problem. They also might study existing models for solutions. For example, termites live in areas with extreme temperatures—searing heat in the daytime and freezing temperatures at night. They build tall “castle-like” structures that also reach deep into the ground to access cooler spaces and allow for convection currents so that the hottest air moves away from the central spaces that the termites occupy. EC Designers might adopt Earth-Resonant features such as this that use passive patterns of heating and cooling within human occupied buildings.

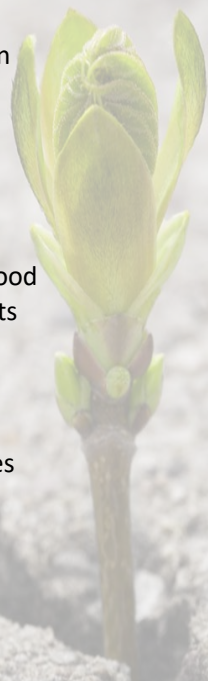
Contrasting Human-Centered and Earth-Centered Design		
	Human-Centered Design	Earth-Centered Design
Desirability	Desirable for humans	Desirable for all Earthlings
Feasibility	Feasible in alignment with technology	Feasible in alignment with dynamics of the earth’s ecological systems and processes
Viability	Viable for business success and profitable in terms of financial gains	Viable for the sustainability of earth’s ecosystems and ‘profitable’ in terms of well-being of all Earthlings

One of the challenges in shifting from design that is Human-Centered to Earth-Centered is helping practitioners to translate the framework into actions. Upon consulting a wide range of literature on sustainable practice and design, we are developing design moves that we believe can help people to practice Earth-Centered Design.

What Does Design Thinking Look Like in EarthXDesign?

Here is a set of ten EarthXDesign Design Moves that we are developing and testing:

1. **Rethink Assumptions:** Analyze underlying assumptions in the problem space. We often make assumptions that limit how we approach a design challenge, for instance, that garbage is waste or that agricultural plantings should be homogeneous instead of mixing crops together.
2. **Think Inside Out:** Switch the problem to its opposite focus. Instead of solving the problem of how to transport fresh vegetables to the locations where they are needed, find ways to grow them in that locale using solar energy. Or instead of finding ways to keep disease-bearing mosquitoes off people with sprays, modify the mosquito so that it cannot breed successfully or won't be attracted to humans.
3. **Mimic Nature:** Look for functional and visual analogies in nature.⁹ Biomimicry can be a powerful source of Earth Resonant design concepts. Consider how the termite towers in the desert allow for convection current cooling or how slime molds come together into a super-organism for certain purposes, but also act as individual micro-organisms at other times.
4. **Empathize with the Voiceless:** Include the voices of those who are not represented at the design table and empathize. Ask which people and non-humans may be impacted and represent their voices. This includes those who are microscopic, non-obvious, unempowered, and voices from the future.
5. **Recast Causality:** Consider alternative causal structures relating to possible designs,¹⁰ for instance, decentralized solar power grids such as those in Bangladesh instead of fossil-fueled, centralized ones that are conducive to sabotage or breakdown. Design for cyclic instead of linear use of resources.
6. **Leverage Local Knowledge:** Mine local wisdom that is essential to the Earth-Resonant success of designs. Invite autonomous adaptation of solutions so that they can be adjusted to work in local contexts.¹¹ Look for traditional, indigenous, and local knowledge and practices that already work.¹² For instance, PlayPump was an innovation to bring water to communities in Africa that worked as children played on playground equipment. Their success hinged upon the amount of time children were able to play, size of the communities served, and characteristics of the underground aquifer.¹³
7. **Reassess Needs and Wants:** Ask whether what we deem to be desirable is truly desirable (e.g., why do we like it? Is it a cultural practice that we are socialized into or the result of unexamined assumptions?). Consider whether you really need designs that make minor tasks easier but are not necessary.
8. **Consider Scales of Impact:** Think about the potential outcomes of a design decision at different levels. Consider it in increasingly broad, concentric circles, from the individuals immediately adopting a design towards more global reach. Recognize the interconnectedness of the system and consider how the design holds impact at different scales.¹⁴
9. **Think Long Term:** Envision the long-term impact of the design. For instance, a plastic bag solves the short-term problem of carrying groceries from supermarket to the parking lot, but in the long term, it harms ecosystems and the health of organisms on the planet, including humans.¹⁵ The large floating plastic mound in the Pacific Ocean exemplifies the problem. Food wrapping that is used to “protect” food from contaminants ends up in the landfill, then burying garbage in landfills creates long-term pollutants and seepage into aquifers that poisons land which can no longer be used to grow crops.
10. **Prioritize Regeneration:** Consider how to renew and restore beyond mitigating negative impacts or avoiding harm.¹⁶ Look for win-win possibilities that create assets from what might be considered negative. Some communities engage in “pee-cycling”—using human urine as natural fertilizer that does not have the downsides of chemical fertilizers. Treating garbage as a commodity invites sustainable approaches to where it goes next instead of where it ends up.



As we develop further techniques and examples of EarthXDesign and study them for how they work in process, we will post this information to our site. As you engage in your own design activities, we hope you will consider adopting an Earth-Centric stance. As earthlings, we are all already onboard planet Earth, so designing for the planet is truly about taking care of all of us.

Acknowledgments

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