

# Viewpoint

## Designing conditions for coexistence



Olivier Cotsaftis, RMIT University School of Design, Melbourne, Australia

Nina Williams, University of New South Wales, Canberra, Australia

Gyungju Chyon, Monash University, Melbourne, Australia

John Sadar, Swinburne University of Technology, Melbourne, Australia

Daphne Mohajer Va Pesaran, RMIT University School of Fashion & Textiles, Melbourne, Australia

Samuel Wines, Co-Labs, Melbourne, Australia

Sarah Naarden, Initiatives of Change Australia, Melbourne, Australia

“When I was young, design meant no more than what we now call *relooking* in French. To *relook* means to give a new and better look or shape to something — a chair, a car, an interior — which would otherwise remain too clumsy, too severe, or too bared if it were left only to its naked function. Design, in this old and limited meaning, occurred by adding a veneer of form to creations, some superficial feature that could make a difference in taste and fashion. Today, however, design has been spreading continuously so that it has been extended from the details of daily objects to cities, landscapes, nations, cultures, bodies, genes, and, as I will argue, to nature itself — which is in great need of being re-designed” (*In memoriam*, edited from Bruno Latour, 2011: 151).

To each designer, their practice. And yet, in today’s hyper-connected world, capitalist logic elevates economic and technological development over

social and ecological justice. As a result, and despite the emergence of alternative design practices addressing the multi-faceted crises of the Anthropocene, the world is increasingly made unsustainable by our design choices (SCBD, 2020; IPCC, 2023; UNEP, 2022). Cue the deepening critique of anthropocentric design practices and widening interest in systemic and/or biological approaches to design and innovation such as circular, regenerative, transition, pluriversal, and more-than-human design (Chapman & Gant, 2007; Cole, 2012; Irwin, 2015; Moreno et al., 2016; Escobar, 2018; Roudavski, 2020; Sacks et al., 2022, to reference a few).

Design studies are indeed increasingly seeking to challenge the utilitarian view of nature as a limitless resource for human activity. They have done so by critiquing the history of design with its focus on human flourishing at the expense of planetary conditions (Fletcher et al., 2019; St. Pierre, 2019); highlighting the reductive binary between nature and culture drawn within sustainability discourses (Fletcher, 2017; Williams

### Corresponding author:

Olivier Cotsaftis

[olivier.cotsaftis@rmit.edu.au](mailto:olivier.cotsaftis@rmit.edu.au)



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& Collet, 2021); exploring efforts to rethink humanity's relationship to nature through bio-design (Sawa, 2016; Cotsaftis, 2021); or again, assaying the interdependencies between organisms and forces of the Earth (Haraway & Endy, 2019; Rupprecht et al., 2020). In addition, critical reflections on biological approaches to design and innovation have drawn attention to the risks of entrenching neocolonialist and capitalist thinking within these very design approaches. For example, works have examined how the practice of biomimicry maintains the Enlightenment production of nature as a world *out there* for human civilisation to capitalise on (Fisch, 2017; Goldstein & Johnson, 2015), while others have drawn attention to notions of biopiracy and biocolonialism whereby Indigenous peoples' knowledges are both erased and profited from by biodesign companies (Ginsberg & Chieza, 2018; Ginsberg et al., 2019).

Amidst the influence that Anthropocene discourses have had in highlighting the urgency of the impact of human activities on the Earth's climate and ecosystems, it is no doubt that design discourses today are well-versed in the language of sustainability, circular economic models, and regenerative practices (Mang & Reed, 2012; Escobar, 2018; Wood, 2022). Out of these debates, we are particularly wary of 'good Anthropocene' narratives that problematically posit the Anthropocene as an opportunity for human ingenuity and techno-solutionism (see Brooks et al., 2017; Forlano, 2021). Falling into this category is, for example, the belief that energy generation and storage technologies will be sufficient to "fix" climate change, or again, the widely publicised 170-km-long city dubbed *The Line*, for which construction has already commenced in the Saudi Arabian desert (Crook, 2022; Greenfield, 2022). Considerations for nature in *The Line* are secondary to human needs, and the project advances a technological vision of the future as a means to address the scale and urgency of the socio-ecological issues at stake (Neom, n.d.). The main

issue with such narratives is the belief in techno-solutionist 'magic bullets' that imply, optimistically, that the Anthropocene should be seen as the site of potential innovation rather than a call for social, political, and economic transformation.

In dialogue with these works, our contention is that the human remains a central figure in emerging endeavours to rethink the practice of design in the Anthropocene. In a rewilding project, for example, where the objective is to protect a given environment and return it to its natural state, the presented benefits are often oriented around human perspectives. Similarly, as St Pierre (2019: 101) recognises, while the popularisation of biophilic design has the potential to transform society's connection with nature, its perceived value is often posited as a means of enhancing human wellbeing — biophilic design being reduced to the provision of "nature as a service". Crucially, biophilic design practices often miss acknowledging the symbiotic entanglements of the non-mechanical, non-digital living systems underpinning life itself, the self-reliance and wellbeing of which are most commonly known through, for example, the influence of the gut microbiome on human health or permaculture design (Holmgren, 2020). Biologically speaking and as recently exemplified by the COVID-19 pandemic, humanity simply isn't the natural master over the broader ecological system but is inherently a part of and bound to it.

As a point of departure, more-than-human approaches to design offer an opportunity to develop new processes and methods that work *with* rather than *for* the living.<sup>1</sup> Fieuw et al., (2022: 2) define more-than-human design as an approach to design that "accounts for nonhuman agencies, recognises humanity's entanglements with ecosystems and the planet, works towards multispecies justice, and designs for cohabitation". In terms of the outputs that such design endeavours engender, we might think of *The Other Place* by Olivier Cotsaftis (2022), a more-than-human architectural system that employs a

combination of design strategies to foster species mutualism and safeguard the environment (e.g., a meshed network of circular biosystems, an intricate biophilic and parametric green skin, etc.). More broadly, more-than-human design is often exemplified through high-profile projects such as Daisy Ginsberg’s *Pollinator Pathmaker* for Serpentine Galleries (2022) — a garden designed according to pollinators’ needs — or Rachel Armstrong’s pioneering work in the field of Living Architecture (Living Architecture Systems Group, n.d.). Of importance, it must be said here that letting go of our inherent humanistic hangover when practising more-than-human design requires continuous attention and effort.

Guided by the above, we propose the novel ontology of Designing Conditions for Coexistence to challenge the lingering anthropocentrism of certain more-than-human discourses where the human remains the presumed master, arbiter, or foremost beneficiary of design practice. At the core, we maintain the increasingly familiar claim that design must consider the needs and perspectives of other members of an ecosystem if it is to support harmonious, resilient, and regenerative environments. Rather than redistributing agency to nonhuman collaborators, however, our approach differs by recognising that we cannot be certain that what we design will be beneficial for *all* members of a multispecies environment, and that we can only seek to construct conditions capable of supporting the coexistence of living species with other living and nonliving things.

## *1 Reflections and emergence*

In June 2022, we (the authors) — a diverse group of academics, practitioners, and entrepreneurs from material design, textile design, industrial design, architecture, cultural geography, business, and the Arts — came together for two workshops at RMIT University, Australia. As a collective broadly interested in Latour’s expansive definition of design introduced above (2011: 151) — and, no less, his pioneering critique of the division between

nature and society (1993) — we ask: how can the integration of nature in design studies disrupt rather than maintain a clear separation between humans and other ecological forces? And if more-than-human design practices are so widely diverse and singular, can a common approach be defined for Designing Conditions for Coexistence? Below we present four essays written from the practice perspective of our collaborators before outlining five principles to support the enactment of the Designing Conditions for Coexistence ontology into practice.

### *1.1 Gyungju Chyon and John Sadar: the boundaries we place on living with others*

It was spring when we, a product designer and an architect, first ordered moss for a design project. It arrived by post atop soil or wood chip substrata and two months later, our moss was thriving with verdant foliage. One morning, we were delighted by the appearance of small, orange fungi that disappeared almost as quickly as they had arrived. Days later, we noticed small flies and a week later, we saw a mysterious orange worm crawling across the moss. Without a moment’s hesitation, we killed the worm. Our moss had brought with it an entire ecosystem ... and we were not sure we wanted that (see Begon & Townsend, 2020 for a relevant reflection on ecosystems). When all living and nonliving things are tightly interconnected to form a meshwork of mutual existence, where do we draw the boundary of what to welcome and what to keep out (Morton, 2010)? Do we want boundaries that are porous and leaky (Armstrong, 2018)? Or do we want to keep the boundaries of indoor and outdoor, human and nonhuman clearly defined?

The *Monarch Sanctuary* by Terreform One is a proposal for a commercial building in Nolita, Manhattan, which offers a means of co-existing alongside monarch butterflies (Joachim, 2019). The most outwardly visible aspect of the design is its façade — a 1-m-thick diagrid providing a

semi-enclosed, vertical, urban-scaled terrarium for monarch breeding. This layer is conceived as a techno-industrial product continuously subject to control, whether in the form of, for example, butterfly-shaped drones providing surveillance or bio-engineered systems ensuring optimal living conditions for the butterflies. While this layer that enwraps the building promises habitat for butterflies, it is also largely sealed off from the building itself. The designers call this wrapper a vertical meadow and it does, at first glance, have some elements of a meadow, from charismatic insects to the vegetation on which they feed. While a meadow is unmanaged and open to flora and fauna, the vertical meadow is largely enclosed between glass and ETFE plastic panels, providing a protected world for butterflies. As such, the vertical meadow may attract organisms other than the monarchs and nourishing plants, but these organisms may not necessarily be welcomed and appreciated — just like the ecosystem that our moss brought into our apartment. As Mary Douglas (1966) reminds us, anything not in its proper place becomes a problem, an affront to hygiene and control. Unintended lifeforms may be viewed as invading pests, which ought to be curtailed. Living with others in this case means to live in one monocultural habitat — the office building — and gaze onto another — the butterfly façade. We are invited to see, but at the same time, kept apart.

Rather than creating exclusive, closed delineations between us and our potential cohabitants, perhaps boundaries could be open, receptive, and graduated. We had purchased our moss for a speculative project, *Topiary Mist*, which explored fog as a carrier of moss spores. The distribution of moss is thus a result of the organic interplay of humidity, air temperature and movement, light conditions, and topography. A similar approach is taken in Marcos Cruz and Richard Beckett's *Bioreceptive Concrete* panels (2016), which imagines buildings as armatures for the growth of cryptogams like moss, lichen, and algae. The concrete panels have been

engineered to enable opportunities for the growth of organisms, without prescribing it; and suggest an unscripted way of co-habitation that differs from the *Monarch Sanctuary* in that they provide opportunities rather than determine an environment. Rather than a closed world that protects an inner sanctum, *Bioreceptive Concrete* implies an open relationship with other organisms and welcomes unforeseen interactions between living and nonliving things in the environment.

While our moss brought with it an assortment of uncomfortable ecological baggage, perhaps the ideal for cohabitation is not to close us off from the world entirely. The open quality, which we were pursuing in *Topiary Mist* and is so clearly evident in *Bioreceptive Concrete*, presents an alternative for coexistence that gives space to other organisms in a way that encourages heterogeneous polycultures. Rather than creating discrete layers for particular species to inhabit, this approach involves giving space to emergent organisms and phenomena to find their own potential.

## *1.2 Daphne Mohajer Va Pesaran: When does the shaping of a paper shirt begin?*

Textiles are one of the oldest forms of technology based on human/nonhuman interactions and have been instrumental in social developments not only as functional tools (Postrel, 2021) but as expressive materials with an immense narrative capacity (Garlock, 2016). In the age of the Anthropocene, however, the fashion and textile industry — predicated on classic capitalist structures of growth, obsolescence, resource extraction, and top-down production — is “old-fashioned” (Edelkoort, 2017) and in need of radical methods that “challenge existing hierarchies of designer, producer, and consumer” (Clarke, 2008, p. 429). This invitation to think radically about alternatives opens the door to new design paradigms and

necessitates the development of ethics for inter-species collaboration.

Indeed, the relationship between the cultural and natural worlds is changing and with this change, new methods of producing materials and forms have emerged that are the product of embedded relationships with nonhuman collaborators. Despite the inherent anthropocentricity of certain interspecies design practices (as discussed by [Keune, 2021](#)), can we develop a practice of making that surrenders more of the process to nonhuman organisms? An answer may involve developing practices of making through nurturing and growing, which would require a departure from the conventional system of extracting resources and processing them into forms and materials. Growth in this sense does not only denote a biological function, but a process of emerging and coming into form. Consideration of [Hallam and Ingold's \(2016: xiii\)](#) declaration that “there has been an overwhelming bias towards artefacts over organisms, or towards things that have been made rather than things that grow” allows for a perspective on fashion and textiles that shows them not as discrete objects but moments of material and energy flow — in a constant state of becoming and being shaped.

When does the shaping of a paper shirt, for example, begin? The shaping happens long before the patternmaker or designer decides how to cut the cloth and style it. Just as the potter's clay comes from sediments shaped eons ago, the paper shirtmaker's paper is shaped by processes just as old, and just as embedded in a landscape as clay (e.g., weather, groundwater, human care, etc.). The maker takes a position as a nurturer of the material — coaxing it out of its original location — in “a negotiational, sympoietic process of nurture and exchange” ([Mohajer Va Pesaran, 2018, p. 85](#)). The negotiation in the process occurs when the maker affects the material or, as [Hallam and Ingold \(2016\): 4](#) suggest, when “the maker effects an ontological transformation in the

material, not through the application of exterior force to inert substance, but through intervening in a play of forces and relations both internal and external to the things under production.” This process of nurture and negotiation is at the core of multiple projects that traverse the boundary between human and nonhuman agency and encourages the emergence of form and material to produce a design.

Recognising the environmental contingency of textile production in this way has the potential to point toward non-hierarchical relationships between human and nonhuman organisms. However, it is important to recognise that any non-hierarchical relationship is still governed by the human in the relationship, because the willingness of the nonhuman partner cannot be ascertained, e.g., our pets who live in our homes or the plants and animals that provide the raw materials for our clothing. We do not live every day with a constant awareness of the deeply contingent relationships with the nonhumans that animate our world, but interspecies collaborative design methods can be conceived as tools that allow us to see and question these relationships, and even build new ones. The discussion of this new paradigm for design can, however, easily be tinged with Utopian rhetoric, and it is important to be aware of the potential for mutual entrapment across species. In other words, nonhumans cannot give consent in the same way humans can. This means that nonhuman organisms could once again become a resource for extraction, while, on the other hand, the human designer could become a custodian of an entire landscape so bound by maintenance that they cannot escape.

### *1.3 Samuel Wines: Biotechnological design is not value-neutral*

In 2020, my business partner Andrew Grey, a microbiologist and I, a biologist, co-founded Co-Labs Melbourne — a biotechnology co-working space and transdisciplinary innovation hub. In brief, we are working with our academic,

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government, and industry partners to catalyse *transformative innovation* (as framed by [Leicester, 2020](#)) and accelerate humanity's transition towards circular, equitable, and regenerative economies. Although supporting the development and commercialisation of biotechnological designs, fundamental to the working ethos of Co-Labs is that technology alone cannot be the only means of mitigating the major socio-ecological problems of our time. "The promise of a better tomorrow is no excuse for the inequitable, unjust, and harmful deployment of technology today", writes Laura [Forlano \(2021, para. 4\)](#). In what follows, I would like to highlight how alternatives to traditional capitalist and techno-solutionist narratives influenced Co-Labs Melbourne and could inform the wider project of Designing Conditions for Coexistence.

First, it is our belief that cultivating eco-literate worldviews and acquiring an understanding of the dynamic relationships between life and the environment is vital for innovators (see [Raworth, 2018](#), and [Elkington, 2020](#), for discussions on alternative economic models such as the doughnut economy and regenerative capitalism). Working with our partners, we weave living systems and ecological design thinking to support business models that create *win-win-win* situations (i.e., where nonhumans are also a winner, [Wahl, 2016](#)). For example, one of our recent collaborators is looking to help restore golden kelp forests on the east coast of Australia by building Australia's first commercial, large-scale, and regenerative kelp farm. This value-driven enterprise has the potential to capture more carbon than a terrestrial forest of equivalent size and will be responsibly harvested to ensure ecosystem wellbeing and regeneration. This form of thinking is also visible in the metaphors we use. Due to the degree to which language shapes our view of reality ([Lakoff & Johnson, 2003](#)), wherever possible, we seek terminologies capable of transitioning away from seeing the world as a lifeless machine and moving towards seeing it as a dynamic,

living, complex adaptive system ([Gorissen, 2022](#)). When speaking to stakeholders, for example, we describe our organisation as operating like a mycelial network — symbiotically sharing resources amongst business partners while valuing collaboration over competition.

Second, in a world of ever-increasing technological prevalence and complexity, adopting ontological design principles in design innovation is becoming increasingly relevant. Ontological design invites us to become aware of how technology shapes our way of being in the world ([Escobar, 2018](#)) while acknowledging the intrinsic values inevitably embedded in our human—technology interfaces ([The Consilience Project, 2022](#)). Our tools and technologies have indeed a disproportionate effect on societal power dynamics and have led to drastic alterations of the socio-environments in which we live. As such, Co-Labs Melbourne has been designed from the ground up to embrace a plurality of perspectives when embarking on projects. For example, we are currently exploring the inclusion of a philosopher in residence in project discussions with current and future partners and are actively exploring appropriate ways of engaging with traditional Indigenous knowledge. At stake is the prerequisite that we must nurture epistemological plurality ([Escobar, 2018](#)) so that we can understand how different cultures and disciplines conceptualise and practice coexistence with the natural world.

#### *1.4 Sarah Naarden: Indigenous knowledge and relationality*

As an architect and designer engaging with First Peoples for over fifteen years, I have long been concerned with the resonances between multispecies sustainability, more-than-human approaches to design, and First Peoples custodian relationship to Country. These approaches embody bioregional observations with care for biodiversity, biospheres, geospheres, and ancestral connection to place whilst protecting the rights

of future generations. This line of inquiry is best exemplified in my practice by the establishment of a regenerative biodesign studio co-created at RMIT University in 2019. Through exciting collisions between biologists, designers, ecologists, architects, textile engineers, and First Peoples perspectives, the studio explored functional and speculative prototypes with materials like mycelium as alternatives to plastic packaging and bioremediation for river systems and e-waste.

The studio drew inspiration from the slow movement, of which a famous case study is a 500-year-old living bridge cultivated from artfully entangled tree roots and tended to in ritual and ceremony by the Khasi Indigenous People of Meghalaya, India (Myers, 2018: 28–31). The studio considered if similar living constructions by First Peoples could be found in Australia and discovered that such knowledge is often held in oral storytelling and not in books. On a cultural tour in Mossman Gorge in Far North Queensland, for example, Yulangi Traditional Owner Tom Creek guides us to a living memorial site. Bones of ancestors had been weaved and grafted onto the branches and growing with the ancient Ficus trees — a practical way to ensure the bones did not wash away in the frequent floods. With humour, Tom describes how the settlers in the 1800s lived in fear after discovering the bones strangled in trees. They were told by Elders that if they continued to cut down sacred trees for sugarcane fields, the trees would continue to strangle humans. Tom mentioned the other sacred sites are still off limits today until ‘white fellas’ can be trusted (Creek, personal communication, June 11, 2022).

Global Indigenous leaders reflect this common concern around trust. Kiana Frank, a First Nations ecologist from Hawaii, advocates that Traditional Ecological knowledge should be at the forefront of advancing place-based innovation. Such knowledge has been tested and adapted with models of sustainability and resilience in

numerous cycles of changing climates, in some cases for thousands of years. But barriers to cultural knowledge also need to be established to ensure that First Peoples’ oppression is not continued. London-based artist and curator Ahilapalapa Rands warns that “biopiracy operates through further extracting and mining of our (indigenous peoples’) knowledges of the natural world” (Ginsberg et al., 2019: para. 1). To address this complicated issue of trust, I have focused on building local relationships with First Peoples, and I am fortunate to be co-creating intercultural intelligence programs with Uncle Shane Charles, Yorta Wurundjeri Boon Wurrung man at Initiatives of Change Australia.

In my experience of coordinating socio-ecological design programmes that engage with First Peoples, I hear accounts from architects and designers who desire to decolonise their practice but fear making mistakes in protocols when engaging First Peoples in collaboration. But placemaking with intercultural and multispecies collaboration needn’t be onerous. It might simply begin by “having a yarn around a fire with a cuppa, it’s not rocket science,” says Uncle Shane Charles (Charles, personal communication, April 28, 2022).

## *2 Enactment into practice*

Building on these essays, recent peer conversations, past years of practice, and by way of synthesis, we’d like to point towards five principles for Designing Conditions for Coexistence that could form the basis of a shared ethos across more-than-human design practices.

### *2.1 Designing with living systems rather than for the living*

As a starting point, acknowledging the need to design with living systems rather than for the living represents a fundamental shift in how design interacts with the natural world. Design typically focuses on creating objects, environments, and experiences for humans, often at the

expense of nature. This has led to a disconnection between humans and natural systems, as well as climatic and environmental degradation. But whereas designing for the living is a benevolent approach to design concerned with generating value for foreign beneficiaries, the use of the preposition *for* semantically others the human actant from the design object. On the contrary, designing *with* living systems (i.e., *in collaboration with* living systems), is greater than the former as it also acknowledges the connections and interdependencies between the various living species of an ecosystem — the human is thus not obscured, being both the actant and the direct or indirect beneficiary of the design.

In section 1.1 above, Chyon and Sadar reflect on the need for design practices to encourage interspecies collaboration. Rather than creating “discrete layers for particular species to inhabit”, more-than-human design should provide the geographies (and temporalities) for “emergent organisms and phenomena to find their own potential”. Seen through this lens, more-than-human design is not simply about enhancing biodiversity and promoting healthy ecosystems, but it is also about acknowledging the need to facilitate symbiotic relationships amongst the living as well as interspecies mutualism. For example, approximately 90 per cent of all plant species rely on fungal symbiosis for the provision of the nutrients necessary for their growth (Bonfante & Genre, 2010); and despite the potential for deleterious effects of an unbalanced gut microbiota, human–microbe interactions mainly appear to be mutualistic (Schluter & Foster, 2012). Mutualism plays a vital part in ecology and evolution. And yet, as the planet warms and pollution levels increase, many species involved in mutualisms have been impacted, often with devastating results, as exemplified in Australia by the loss of symbionts in bleached corals in warming and acidifying waters (Six, 2009). “Future changes are likely to be even more severe,” writes Six, leading, for example,

to mutualism shifting to parasitism and in some cases, extinction. Amidst the current rate of species extinction now as much as “100 times that of the “normal rate” throughout geological time” (Ceballos & Ehrlich, 2018), designing with living systems should not be seen as a utopian naive reverie, but as a necessity that could translate into alternative modes of design education and practice.

A vital premise in this transition is what Escobar (2018) terms *ontological design*, which takes the contention that any design practice is designing what society becomes. Escobar writes that tools or technologies are “ontological in the sense that, however humbly or minutely, they inaugurate a set of rituals, ways of doing, and modes of being” (2018: 110). Thus, if the human is constituted in its relationship to design practice, and if consequently design is not simply designing for the human but is designing the human — and ipso facto, its environment — designing *with* living systems creates opportunities to transform conditions for coexistence.

## 2.2 Adopting an ethics of care

Second, Designing Conditions for Coexistence must adopt an ethics of care. This principle is informed by Haraway’s theorisation of the Chthulucene (2016) and Puig de la Bellacasa’s research on permaculture (2017), which have been influential in design studies for advancing a concept of care towards the nonhuman. For example, in seeking to move design from its human centrings and instead open “new narratives for design and nature”, Fletcher et al., 2019 turn to Haraway (2016) and Puig de La Bellacasa (2017) for distributing responsibilities and care, which they suggest challenges modernist conceits in design such as the “star designer, the lone genius, the perfect solution or product, the finished building” (p10). For us, these works present opportunities to think about ethics as a speculative but no less pragmatic affair (Williams & Keating, 2022). To adopt a



speculative ethics of care is thought by Puig de la Bellacasa as the practice of “everyday ecological doings” (2017: 22), a practice that keeps open the uncertainties and incompleteness of a process and is thus amenable to the different contexts in which it takes place. In the context of design, this would entail a mode of attentiveness to that which emerges during practice, even where that might seem to fail or contradict prior expectations. We might think here of the importance of what Escobar describes as ‘breakdowns’ or ‘situations of non-obviousness’, which are “not something negative but provides the space of possibility for action, for creating domains where new conversation and connections can take place” (2018: 113). A speculative ethics of care is equally at stake in Mohajer Va Pesaran’s contribution, where she suggests multispecies ethics must be ‘emergent’ or ‘coming into form’ rather than based on designs as discrete objects.

Adopting such an ethics of care is never more crucial than in the context of more-than-human design, where the outcomes of designing with bio-materials or within multispecies conditions will likely be indeterminate and unruly. Indeed, when designing with living systems, care attains unique meanings since death and violence necessarily circulate in the flourishing of life. As Mohajer Va Pesaran reminds us in thinking about the ethics of interspecies design, it is critical to pay attention to the complicated issues of consent and recognise that ‘distances’ and ‘detachments’ exist between species just as much as resonances and relations (Ginn, 2014). While we clearly cannot maintain the same processes of consent in more-than-human research as we would in human-centred research, speculating with what those processes could look like offers opportunities to rethink those guidelines themselves (Bastian, 2016). In the context of Indigenous-led research, for example, working with Country demands developing a certain mode of consent toward nonhuman processes to “acknowledge their boundaries and limits, and follow processes

of meaningful engagement, consultation, and sharing ...” (Yandaarra with Gumbaynggirr Country, 2022: 710).

If more-than-human design sometimes fails to live up to its title, it is precisely because it inadequately addresses the tensions of multispecies practice, celebrating ideas of partnership, co-design, and collaboration, while overlooking the dangers of imposing human values and ways of working. It thus ends up maintaining the relations of mastery that it paradoxically seeks to depart from.

### 2.3 *Applying circular and regenerative design strategies*

A third principle relates to the adoption of circular and regenerative strategies in more-than-human design. In *Regenerative Enterprise: Optimizing for Multi-capital Abundance*, Roland and Landua (2015) propose considerations for eight forms of capital in regenerative business practices: financial, social, cultural, experiential, intellectual, spiritual, material, and living capital. Material capital, in particular, speaks about the use of resources in the manufacturing of goods and services and is directly linked to the current conversation on our transition to the circular economy; whereas living capital uses carbon, nitrogen, and water as currencies and is linked to the regeneration of lands and ecosystems through business (or design) operations. Considerations for these two alternative forms of capital are not only discussed in academic circles and charitable organisations such as the McArthur Foundation but are also increasingly adopted in commercial ventures.

Traditionally the domain of academic and artistic practices, New Materialism studies, for example, are now being translated into commercially viable initiatives. This is evidenced by the recent launch of a plethora of circular and regenerative biomaterial startups aiming to sustain the development of material and living capitals in their operations (e.g.,

*Great Wrap* and *Nanollose* in Australia). From the type of organic matter to the knowledge, skills, technologies, and resources necessary to innovate, the success of these ventures often relies on a deep understanding of the socio-ecological contexts in which they operate. Most importantly, the business ethos of these ventures is key to their success. In section 1.3 above, Wines advocates for “epistemological plurality, so that we can understand how different cultures and disciplines conceptualise and practice coexistence with the natural world.” Such openness and curiosity rather than individualism and protectionism are vital starting points for transitioning from a linear and destructive to a circular and regenerative economy.

Further, and against a backdrop of disappointment with the United Nations’ Sustainable Development Goals (SDGs), new frameworks for regenerative economies are emerging. Adopted in 2015 as “a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity” (UNDP, n.d.), the SDGs have been criticised for being difficult to quantify, implement, and monitor, with problematic inconsistencies between the socio-economic and environmental goals (Demaria & Kothari, 2017; Swain, 2017). Taking one practical alternative, (Cotsaftis, 2023) proposes ten circular and regenerative design strategies to “challenge the utilitarian view of nature as a limitless resource for human activity while preserving creativity, innovation, and entrepreneurship.” Building on these strategies, *Designing Conditions for Coexistence* does not aim for idealistic ideologies detached from today’s realities. On the contrary, enacting the ontology of *Designing Conditions for Coexistence* has indeed the potential to advance climatic and environmental sustainability, but is also expected to improve human health outcomes and boost the productivity of agriculture and industrial processes through the use of circular and regenerative strategies in design practice (Issa et al., 2019; Muscat et al., 2021).

## 2.4 Embracing pluriversal thinking

Our fourth principle is informed by postcolonial critiques of Western design narratives that seek to pluralise design research with a greater multiplicity of experiences and perspectives outside of the Global North and/or Western tradition. At the heart of pluriversal design discourses is an endeavour to expose the historical power imbalances within design established through colonial exploitation, while at the same time seeking to disrupt Eurocentric modernity and development discourses in design (Escobar, 2018; Leitão, 2020; Noel, 2020). Leitão (2020: 4), for example, conceptualises “a world of many centres, a world where multiple ways of being, thinking, knowing, conceiving reality, and world-making can co-exist” as a key tenet for pluriversal design.

In *Designs for the Pluriverse*, Escobar (2018) suggests it is imperative to substitute capitalist modernity and Eurocentric development initiatives with alternative imaginaries of post-development and de-growth. For Escobar, notions of development and modernity are inherently problematic in the context of pluriversal design because they have acted as forces of homogenisation, centralising economic growth as a common goal without recognising the unsustainable limits growth and development have on social and ecological systems. Discussing a case study of Carnegie Mellon University’s *Transition Design* framework (see Irwin, 2015; Manzini, 2015; Tonkinwise, 2015), Escobar finds resources for revisioning design through racial, cultural, and institutional transformation. One of the core principles of *Transition Design* (*Designs of Social Change*) foregrounds the interconnectedness and interdependency of social, economic, political, and natural systems. As Tonkinwise (2015: 86) writes, “*Transition Design* assumes that designing must play a central role in the systems-level change that our societies need to undertake.” At stake here is the idea that it is impossible to achieve ecological justice in design

without also working towards social transformation. This is a claim equally addressed in Naarden’s contribution above when discussing how First People’s custodianship of Country embodies “bioregional observations with care for biodiversity, biospheres, geospheres, and ancestral connection to place whilst protecting the rights of future generations” — a conversation that is intertwined with our second principle of adopting an ethics of care.

If, as pluriversal design work makes clear, designing for social change must commence with an understanding and willingness to engage with multiple perspectives, a central consequence is that universal solutions become futile. Pluriversality means taking seriously the specificity of a culture — or nature — rather than looking for ‘one-size-fits-all’ solutions. This of course may be a bit of a learning process and entail working with differences as they arise. In Naarden’s account of her practice, she warns against allowing the fear of making mistakes when working across cultures to become the limit of any collaboration. The implication of pluriversal discourses on more-than-human design is not that the processes of designing can or should bring all experiences, perspectives, or needs into some harmonious whole — an impossible task whether for different cultures or different species — but that it is imperative to work with differences as a starting point for Designing Conditions for Coexistence.

## *2.5 Relinquishing control*

Our final principle is a reflection on the limits of control in (more-than-human) design, a field in which control is perhaps best epitomised when we think of the designer perfecting their practice over time and showcasing finished, polished artefacts rather than works-in-progress. More specifically in the context of more-than-human design, aspirations for control become problematic since it is impossible for practitioners to fully apprehend the complexities and interdependencies of the living systems in which design happens and

for which the development of more ‘ad-hoc’ approaches is often required (Williams & Collet, 2021). The irony when discussing control in more-than-human design is that each organism of a living system presumably assumes its reality to be entirely objective. Meanwhile, different species in the same ecosystem pick up on different environmental signals. In the blind, deaf, and hyper-localised world of rooted vascular plants, important signals may include light composition or micronutrient concentrations. For platypuses, this may be electrical fields that humans would be blissfully unaware of. Life happens without us noticing. Given that this complexity is barely registered by the human species, a question begs to be asked: can more-than-human practitioners really play any part in designing nature, “which is in great need of being re-designed” as Latour suggested (2011: 151)? Asked in such grand terms, probably not. However, if practitioners allow themselves to relinquish control and instead think of designing as “a form of exploratory questioning that presumes no power and seeks no answers; looking only for relationships” (Fletcher et al., 2019, p. 10), they might just Design Conditions for Coexistence capable of supporting the flourishing of ecologies and benefiting planetary conditions.

## *Declaration of competing interest*

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## *Data availability*

No data was used for the research described in the article.

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## Notes

1. The term 'more-than-human' in design studies has been broadly used to refer to design with and by nonhuman actors such as biological agents and living systems (de La Bellacasa, 2017; Fieuw et al., 2022), autonomous digital technologies (Giaccardi & Redström, 2020), and even spirits or deities (Akama et al., 2020). Giaccardi and Redström (2020: 35), for example, write: "[t]aking the idea of machine agency and artificial intelligence seriously, we would like to explore what happens if we think of networked computational things not only as designed artifacts or technological enablers but also in terms of agents in a design space where they actually participate." In this paper, however, our focus is on more-than-human design approaches that emphasise design with and by nonhuman biological agents and living systems.

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